

FLIGHT

First Aero Weekly in the World.

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport.
OFFICIAL ORGAN OF THE ROYAL AERO CLUB OF THE UNITED KINGDOM.

■ No. 162. (No. 5, Vol. IV.)

FEBRUARY 3, 1912.

[Registered at the G.P.O.
as a Newspaper.]

[Weekly. Price 1d.
Post Free, 1½d.]



ABOVE AND FROM ABOVE.—The Hon. Lady Eleanor G. Shelley and party in the car of "Parseval VI" during a trip in the dirigible on January 10th. Below is seen a photograph over Berlin (Schöneberg), snapped by Lady Shelley from the airship.

EDITORIAL COMMENT.

An Excellent Example.

His Majesty the German Emperor, for all his little eccentricities, has an eminently practical way of doing things. In spite of the undoubted engineering ability of the Germans, and the progress they have made in many industrial directions, they have so far not managed to evolve anything revolutionary in the shape of an aeroplane motor. In this respect they are far behind their French competitors and ourselves, with the result that they have been mainly dependent upon French sources of supply for the equipment of their air-craft. Manifestly it is a vital drawback for a country situated like Germany to have to depend upon a possible enemy for so essential a part of its military equipment as the aeroplane must inevitably be in the wars of the future, and it is no doubt this aspect of the case, which, to a large extent has impelled the Kaiser to signalise his birthday by offering a cash prize amounting to £2,500 for the best aeroplane motor. The prize will be awarded on His Majesty's next birthday, and entries for the competition will be received by a committee composed of members of the Imperial Automobile Club, the Association of German Aeroplane Manufacturers, and one representative each of the Ministry of the Interior, the Admiralty, the War Department, the Ministry of Public Instruction and of the Technical University of Charlottenburg. The prize will be awarded in accordance with the decision of a jury appointed by the Kaiser himself on the recommendation of this committee.

It is not the value of the prize itself that counts so much as the prestige attaching to the winning of it, which will undoubtedly prove a very distinct stimulus to the German engineer and inventor, and we do not think we are far out in predicting that it will have a very marked effect on progress in the Fatherland. It may not be the most conventional method of stimulating industry, but it is nevertheless an extremely practical one and, withal, very characteristic of the Kaiser.

A Clean Sweep of the Records.

The beginning of the year has been signalised by a further wholesale breaking of aerial records—which now seems to be quite a fashionable way of inaugurating a New Year. It will be remembered that January of 1911 saw the setting up of several new records, which came in for very bad handling later in the year, and these again have been knocked all to pieces by the doings of the month just ended. In England, Mr. Cody has flown for seven miles with four passengers on board, which is a new British record. On the Continent—in France, needless to say—several new world's records have been achieved. On the 24th, Tabuteau on a Morane flew 205 kiloms. in two hours and 316 kiloms. in three, incidentally breaking the existing times for 200, 250, and 300 kiloms. On the 26th, Bathiat put up new figures on a Sommer monoplane by flying 100 kiloms. in 41 min. 29 $\frac{3}{4}$ secs., and on the same day Molla, on a Sommer biplane, achieved yet another record by flying for an hour with no less than six passengers on board his machine.

These are but passing incidents of the movement, but they are nevertheless eloquent of the wonderful progress that is being made towards the development of the perfect aeroplane. So fast do we progress that it is more than probable that even before these lines appear in print the

records to which they refer will have been relegated to the past as "has-beens," more especially if the calm, cold weather, which has at last come as a welcome relief from gales and rain, remains with us for a few days longer.

Apropos of this matter of speed and duration records, it is interesting to note that Vedrines has made his *debut* as a lecturer on aviation. He made his first appearance at Toulouse the other day, and in the course of his lecture he confidently averred that with the new machine which he expected shortly to fly, he would be able to travel at speeds of from 110 to 125 miles an hour. "One of these days," he said, "I shall start from Pau in the morning and reach Calais in time for tea." And the strange thing about it is that none of his audience imagined for an instant that he was speaking of anything extraordinary or even remotely beyond the actual possibilities. Four years ago he would have been voted mad! There is a good deal of food for thought in it all.

French Military Aeronautics.

The credit of twenty-two million francs asked for aviation by M. Millerand, the Minister for War, has suggested the plan of creating a regiment of aviators. It will be a small one, probably about 400 strong, but it will be the first, and will in all probability be followed by a second and a third. The plan has been discussed by the Supreme Council of War at the Elysée, and has been approved by the President of the Republic. The council decided at once to order 328 aeroplanes for army use, and sheds and repair shops are to be established in all parts of the country. An aviation ground is to be prepared near every fortified place and military camp, the one already existing at Epinal to be taken as a model.

Since his advent at the Ministry of War, M. Millerand has done a great deal to encourage progress in the art of military aviation. To the French officer-aviators ordered to serve in Morocco, he declared that he is determined to keep France in the first rank as regards military aeronautics, and in order to keep in touch with the movement, personally, he intends to hold fortnightly receptions of military airmen. Perhaps Lord Haldane will take a leaf of the French War Minister's book, and hold similar receptions of the officers of our own Air Battalion. At its present strength it would not entail any great sacrifice of his time!

In the meantime we are glad to have our own War Minister's assurance that our position in military aviation is a secure one. Speaking at a dinner of the Durham Territorial Association last week, Lord Haldane said that there were many problems in home defence awaiting treatment. One of them—and they had gone very slowly with it—was aviation, but although they had gone slowly, they had gone surely, and he hoped before long the British public would be reassured on that point. With which hope we find it possible to most cordially concur—but "Hope deferred maketh the heart sick."

While on the subject of military aviation, it is interesting to gather the great importance attached to this branch of military science by the Italian authorities. Apparently, they are so satisfied with the work of their aerial corps in Tripoli that they are using every endeavour to prevent the Turks from obtaining possession of aeroplanes, and have even jeopardised their friendly relations with other Powers to achieve that end.

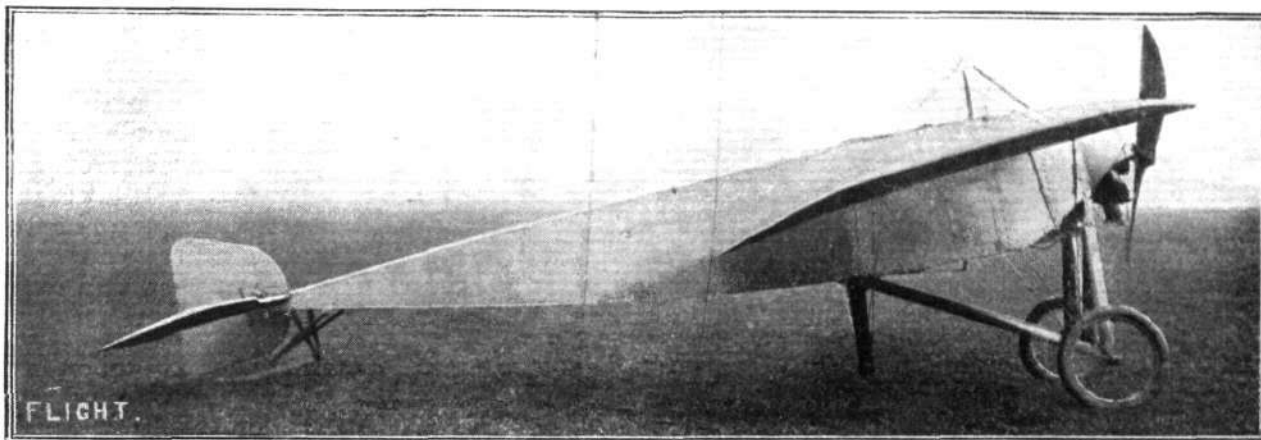
THE MORANE-SAULNIER RACING MONOPLANE.

It is a common opinion among those who had the good fortune to attend the last Aviation Salon in Paris, that the Morane-Saulnier stand was showing machines above the ordinary. In all four types exhibited—a school machine, a two-seater military monoplane, a racer, and a veritable monoplane man-o'-war—were incorporated very excellent and very practical ideas, more especially in the latter two.

So short a time elapsed between the separation of Messieurs Léon Morane and R. Saulnier from the Borel firm and the production

speeds are to be considered. The main body, enclosed throughout its complete length by a covering of fabric, possesses a fairly accurate stream-line form, and is deep enough in the front to accommodate the pilot so that his head alone protrudes above the cockpit, his body being protected from that rush of air which would otherwise have such an adverse effect on his own personal comfort and on the facility of the machine to cleave the air with a minimum of disturbance.

As regards the motor, a Gnome of 50 h.p., the same point has received consideration, and by means of a roughly stream-line casing,



The Morane-Saulnier racing monoplane, as seen from one side, showing the approximate stream-line shape of the body.

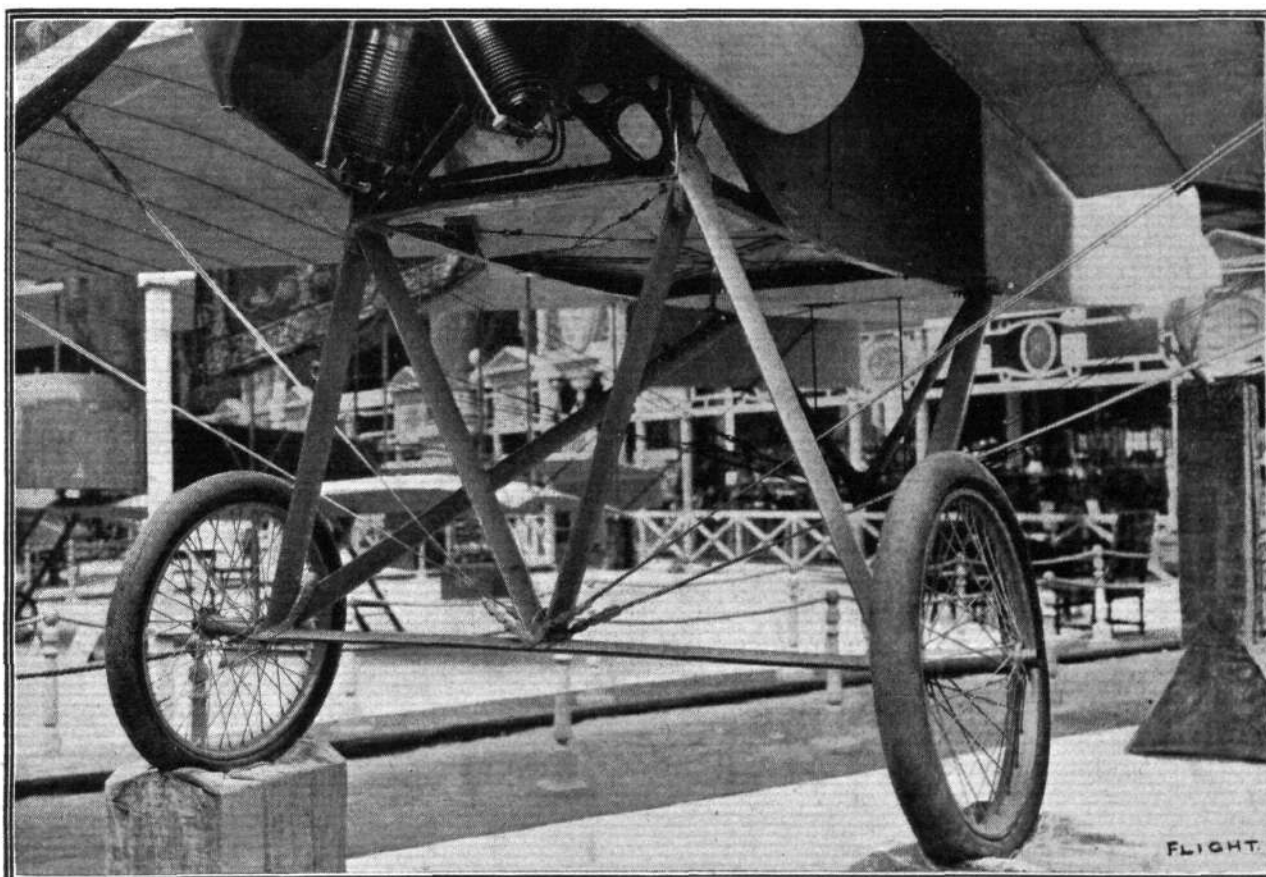
of their first machine, the one at present under review, that we must confess we were most agreeably surprised, when this racer was first tested at Villacoublay, to see Védérines, without any preliminary tuning-up process, take the machine up to over 1,000 ft., and fly for 20 mins. at the extraordinary speed of 78 m.p.h., this with a motor of only 50 h.p.

Identical with the endeavours of almost every constructor at the present time, the chief aim of the designer has been the minimisation of head-resistance, an all-important point when high

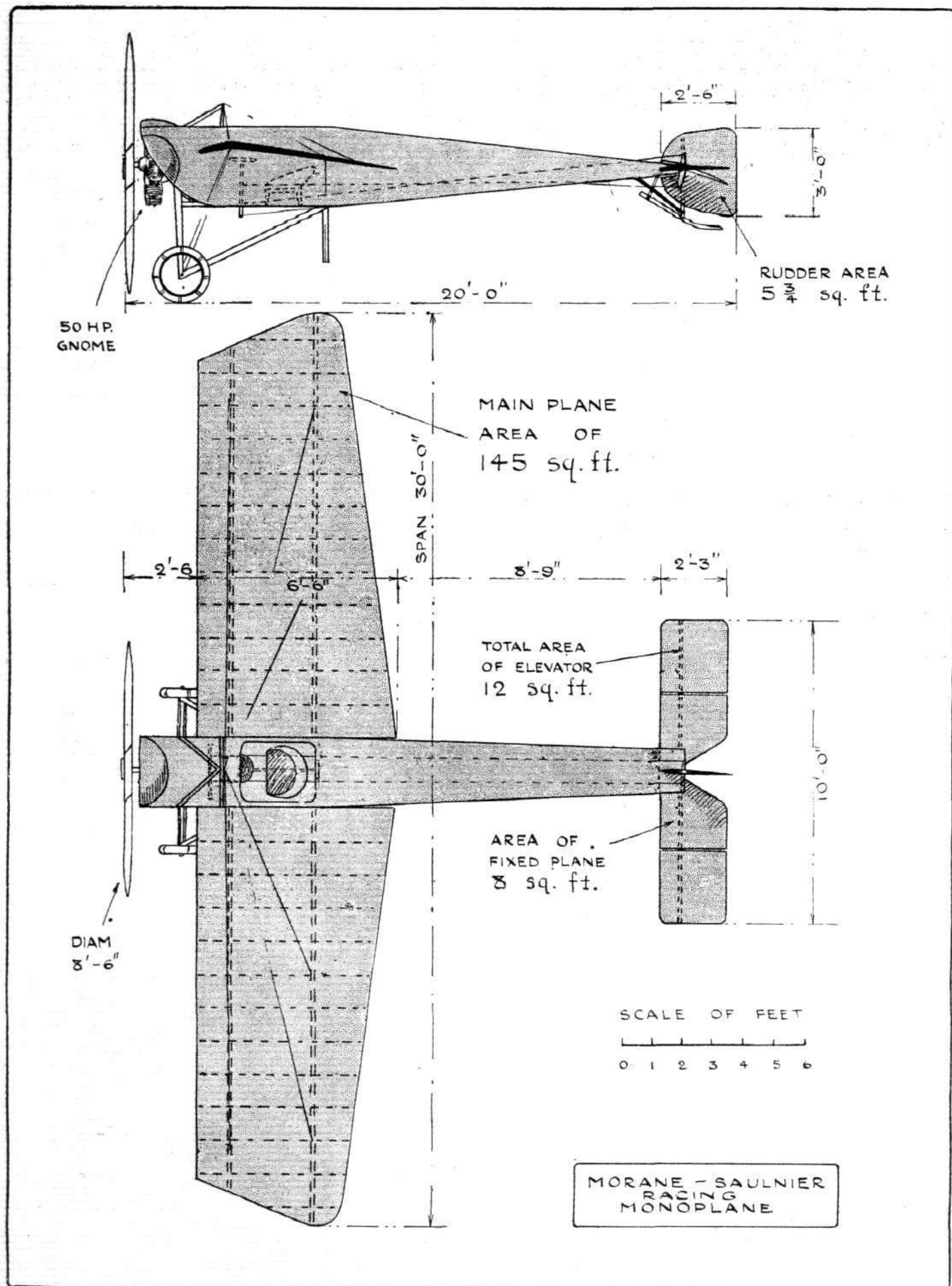
which also forms a shield to prevent any lubricating oil and exhaust products being thrown off in the direction of the pilot, much of the resistance presented to forward advance by the rapidly-revolving motor has been avoided, not, as some might imagine, at the expense of efficient cooling.

The motor is mounted *port-à-faux*, that is, it protrudes from the front of the main body, and is not supported on both sides of the crank-case.

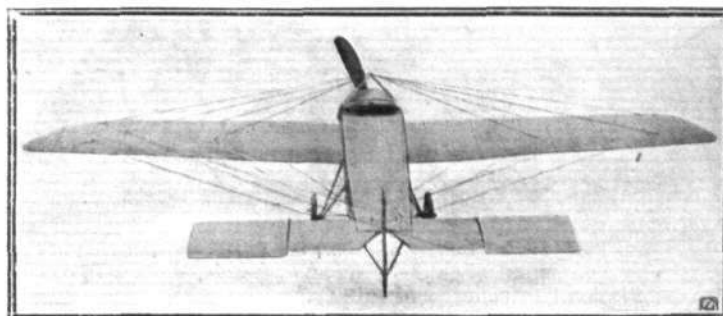
Almost revolutionary is the design of the landing-gear, as, in



The all-steel rigid landing chassis of the Morane-Saulnier racer. Notice the staying of the wings from the apex of the central inverted triangle—a good point.



MORANE-SAULNIER MONOPLANE.—Plan and Elevation to Scale.



The Morane-Saulnier racing monoplane, as it appears from both front and rear.

order to obtain the simplest and strongest arrangement possible, means for shock absorbing, other than that provided by the resilience of the pneumatic tyres with which the wheels are shod, have been excluded from the scheme. One of our photographs well illustrates how this section is constructed from hollow-steel tubing of oval section. If the machine had not originally been devised for the use of experts only, we should have held that the omission of any shock-absorbing device was simply courting trouble. Even with an "expert" at the lever, we can quite imagine wheels buckling, and perhaps tubes bending, if a landing is tried on any but the most smooth of surfaces.

In plan form the wings are almost analogous to a blade of a Chauvière propeller; the entering-edge is shorter than the trailing-edge. It is claimed that the strain felt at the tips is in a great measure reduced by this design, and also that it is possible by this means to obtain a more powerful warp for correcting balance.

The tail is reminiscent of a cross-Channel Blériot, a fixed monoplane surface playing the part of stabilizer, while rotatable ailerons on either side govern the attitude of the machine. A balanced rudder, operated from the pilot's seat by a pivoted foot-bar, effects the lateral steering. Control over the machine is maintained from a Blériot-type central lever.



NEW WORLD'S RECORDS.

Speed Records Beaten.

THE speed records set up by Vedrines did not stand for long, fast as they were, as on Saturday last they were bettered by Bathiat piloting a Sommer monoplane, fitted with a 70-h.p. Gnome motor and Chauvière propeller. Starting off at Douzy with a supply of petrol and sufficient oil for three hours, he was unfortunately compelled to stop, after being up for 49 minutes, by which time, however, he had beaten the records from 10 to 100 kiloms. as shown below.

	New record.		Old record.	
	Bathiat.		Vedrines.	
	m.	s.	m.	s.
10 kiloms.	4	8 $\frac{1}{2}$	4	13 $\frac{2}{5}$
20 kiloms.	8	13 $\frac{1}{2}$	8	26 $\frac{2}{5}$
30 kiloms.	12	25 $\frac{1}{2}$	12	40 $\frac{3}{5}$
40 kiloms.	16	33 $\frac{1}{2}$	16	53
50 kiloms.	20	43 $\frac{1}{2}$	21	4
100 kiloms.	41	29 $\frac{3}{5}$	41	56 $\frac{3}{5}$

During one period of the flight he was timed to be going at a speed of 150 kiloms. an hour, and the time for 20 kiloms. shows that his average speed for that distance was 146.044 k.p.h. which compares with Vedrines' best speed over a single lap of 145.177 k.p.h.

Three days previously Tabuteau at Pau on a Morane monoplane fitted with a 50-h.p. Gnome and a Chauvière propeller put up new figures for the distances from 200 to 300 kiloms. and for two and three hours. He covered the first ten kiloms. in 5 min. 38 $\frac{2}{5}$ sec.,

and proceeding at an even pace had covered 150 kiloms. in 1h. 26m. 1 $\frac{3}{5}$ s. He was still outside the record figures, but on reaching 200 kiloms. he was well inside the figures which previously stood to the record of Aubrun as shown by the accompanying table.

	New records.		Old records.	
200 kiloms.	1h. 54m. 21s.		2h. 18m. 30 $\frac{3}{5}$ s.*	
250 "	2h. 22m. 57s.		3h. 4m. 28 $\frac{1}{5}$ s.†	
300 "	2h. 51m. 41 $\frac{3}{5}$ s.		3h. 40m. 55 $\frac{3}{5}$ s.†	
2 hours	205.287 kiloms.		167.500 kiloms.*	
3 "	316.287		252.500 "	*
	* Aubrun.		† Bournique.	

New Passenger Record.

ON the same day that Bathiat so handsomely beat the speed records at Douzy, Molla, on a Sommer biplane, set up a new world's record by flying with six passengers for an hour. The names of the passengers were: MM. Puysegur, Sergeant, Richy, Labelle, Aubry, and Guichard. At the start there was also 65 litres of petrol and 30 litres of oil on board.

A New World's Passenger Record by Grulich.

ON the 25th ult., at Johannisthal, Grulich on his Harlan monoplane was flying for 1 hour 35 mins. with three passengers. This is a world's record, the previous figures being Warchalowsky's 45 mins. 46 secs.



MICHELIN PRIZES.

International Michelin Aviation Cup, 1912.

It will be remembered that this year's competition for the Michelin Cup calls for a course composed of three circuits, and it is probable that the Aero Club of France will decide upon a course with Buc as the centre of operations. In this event it is suggested that the first day's circuit would touch at Rheims, Amiens, and Rouen, with landings at each place, the distance round being 473 kiloms. The second day's circuit would be a smaller one of only 223 kiloms., the landings being at Orleans and Chartres; while the third circuit would be the longest, 485 kiloms., and entail four intermediate landings at Compiègne, Rheims, Troyes and Meaux. The total distance for the three days would be 1,200 kiloms., and the rules stipulate that an average speed, including time spent at intermediate controls, shall not be less than 60 k.p.h. for each circuit, and 40 k.p.h. for the entire distance. The Aero Club du Centre is already working hard to ensure the success of the Buc-Orleans portion of the race.

Another Michelin Prize.

As a corollary to the target prizes, M.M. Michelin have offered a further prize of 10,000 francs to the Aero Club of France

to be devoted to awards to the makers of the accessory which gives the best results in connection with the launching of the projectiles in the target competitions, to be held before August 16th next. The instruments eligible for the prize include sights, distributors, speed indicators, height indicators, inclinometers, &c., either together or separately, but they must have been used in at least three of the tests for the target prizes.

The prize will be awarded by a jury appointed by the Aviation Committee of the Aero Club of France, and the jury will have power to award the prize to one instrument or set of instruments, or to divide it amongst several. The committee may also call for any special tests. All instruments must be made in France in accordance with the rules of the target prizes. Entries, with a fee of 100 francs, must be made five days before the competition in which it will take part, and the entry will cover all instruments presented by the same constructor up to August 12th, 1912. Five days' notice must, however, be given to the Aero Club of France of each occasion on which the instrument will be in use. The Aero Club of France disclaims all responsibility for any publicity which may be given as to the working of any apparatus which is not patented, and also for the consequences of any accident which may arise in the course of the competition.

SOARING FLIGHT.

DISCUSSION AT THE AERONAUTICAL SOCIETY.*

Definition.

1. Soaring is that mode of flight in which a bird remains indefinitely aloft without flapping its wings.

2. If you take a suitable piece of paper and fix a weight to its edge, it will glide to earth when properly launched into the air. (Fig. 1.)

3. Gliding is also a mode of flight, but differs from soaring in that the path of motion is, on the whole, downwards, whereas in soaring there is no permanent loss of altitude.

4. Flapping flight differs from soaring flight in that the bird exerts visible energy.

5. From these facts may be deduced—what is otherwise a matter of elementary perception—that flight of any description involves the expenditure of power, and that in soaring flight this energy must come from the air.

6. The primary question for discussion is, therefore, what form does this energy take?

7. In general, the accepted answer to this problem may be summed up in the word "wind."

8. Air in relative motion to the earth is wind, and, having mass, wind possesses momentum capable of doing work through suitable mechanisms.

wind, but they are all fallacious. In fact, they are as fallacious as arguments that attempt to demonstrate the possibility of perpetual motion.

Whatever may happen in the first instance, by the inertia of the bird or its initial momentum enabling it to resist the wind for a short while, ultimately the bird and its orbit must both travel at the speed of the wind. Then, the bird is manœuvring in virtual calm—like the fly in the atmosphere of a moving railway carriage—and soaring becomes impossible.

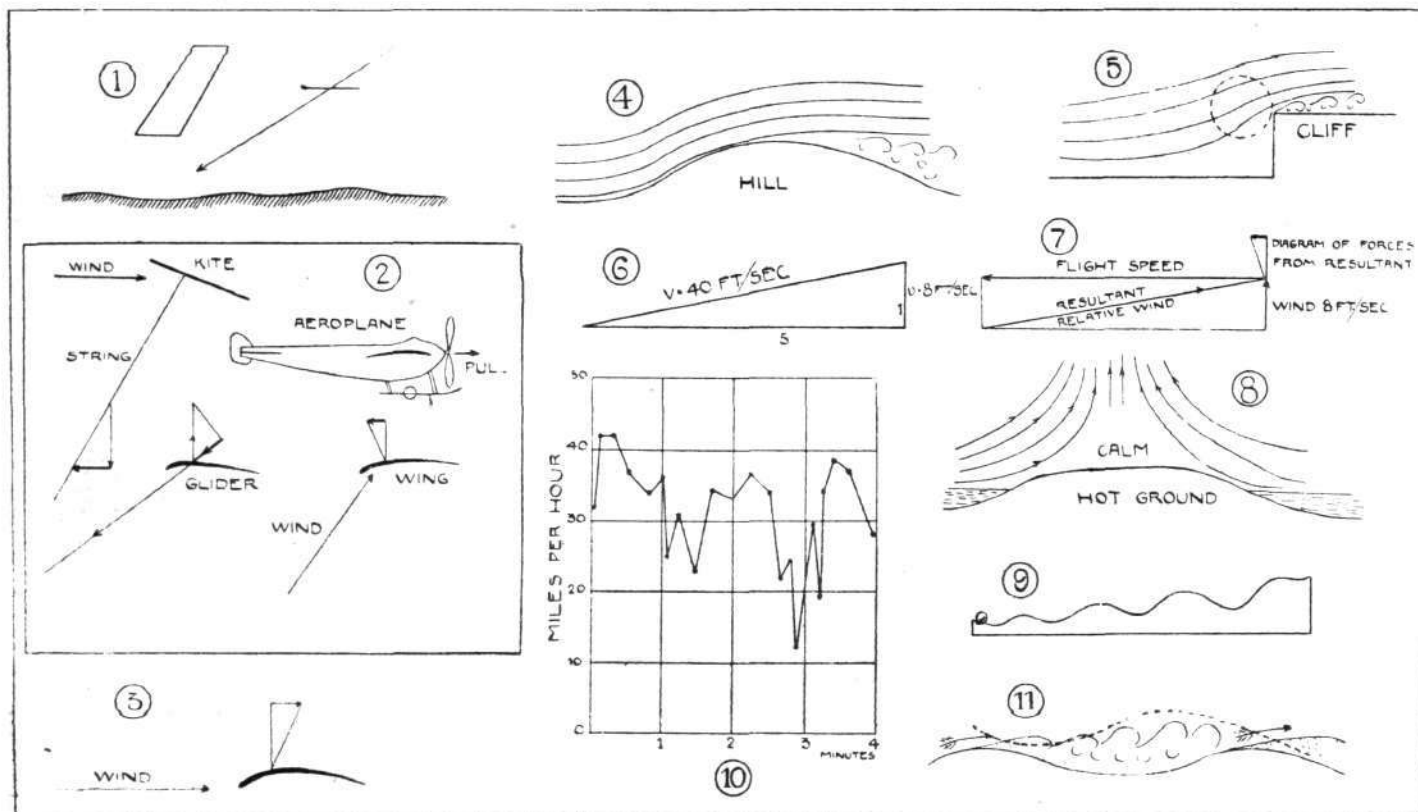
"In the absence of wind, the soaring bird must fall, his soaring flight being no longer possible, he is obliged to flap; it is for this reason that he is seldom an early riser (*matinal*) because the early morning is ordinarily calm, especially in hot countries."—*Mouillard*.

"Any attempt to found the theory of soaring on the horizontal orbit of flight is doomed to failure."—*Lanchester*.

Oblique Winds.

15. If the wind is not horizontal but, although uniform, has an adequate upward trend, sufficient propulsive component will be established to permit soaring flight to be continued indefinitely.

The bird may move when it pleases within the zone of the suitable wind, it may hover over one spot on earth if the conditions



9. A bird's wing is a suitable appliance for extracting energy from the air, as is evident from the phenomenon of soaring.

Propulsion.

10. All forms of flight demand relative motion between the object supported and the air.

11. But the body thus supported offers resistance to such relative motion; consequently it will be blown away in the same direction as the wind unless an opposing force of propulsion enables it to hold its own.

12. In a paper kite, this force is the pull on the string. In an aeroplane, it is the thrust of the engine-driven propellers. In a glider, it is the component of gravity in the line of motion.

In a soaring bird it is the horizontal component of the wind pressure on the bird's wing which has a forward direction (*i.e.*, against the wind) by virtue of the resultant being inclined forward of the vertical (Fig. 2).

13. It is impossible to obtain a forwardly inclined resultant from any kind of wing section in a truly horizontal and uniform wind, hence soaring flight is impossible under such conditions (Fig. 3).

14. Many involved arguments have been put forward to prove that a bird can, by suitable evolutions, soar in a uniform horizontal

facilitate such exact equilibrium, or it may, as more often is the case, circle indefinitely round an orbit that is more or less fixed in space.

"The condors moved in large curves, sweeping in circles, descending and ascending without once flapping. . . the head and neck were moved frequently, and with force, and it appeared as if the extended wings formed the fulcrum on which the movements of the neck, body, and tail acted."—*Darwin*.

"The soaring bird moves in circles for the same reason that a man sits in a chair, because he wants to stay where he is."—*Lanchester*.

16. The least upward velocity component that will satisfy this condition of soaring flight is numerically the same as the rate of vertical descent when gliding in calm.

17. If the wind blows parallel to the side of a hill having the same slope as the gliding path of the bird, the wind must have at least the same velocity as the bird's natural flight speed in order to maintain soaring. (Fig. 4)

18. Obstructions such as cliffs, houses, and ships, cause horizontal winds to trend upwards to an extent that is frequently adequate to maintain soaring.

"The region of greatest up current is evidently immediately in advance of the upper edge of the cliff, and the useful region ma

* Opening argument by Mr. A. E. Berriman, Technical Editor of FLIGHT.

roughly be defined as a circle whose centre is slightly above the level of the plateau, and whose diameter is about equal to the height of the cliff. . . . (Fig. 5). Further, in some cases the up current may arise from the motion of a body through the air in lieu of the air moving past the body. In this way ships, especially sailing vessels, may conceivably become the cause of an aerial disturbance that the soaring bird can turn to its advantage."—*Lanchester*.

"The condor is known to have a wide geographical range . . . the steep cliffs near the mouth of the Rio Negro are its northern limit on the Patagonian coast . . . further south among the bold precipices at the head of Port Desire, the condor is not uncommon, yet only a few stragglers occasionally visit the sea coast. A line of cliffs near the mouth of the Santa Cruz is frequented by these birds; and about 80 miles up the river, where the sides of the valley are formed by steep basaltic precipices, the condor reappears. From these facts it seems that the condors require perpendicular cliffs."—*Darwin*.

19. If a bird has a gliding angle of 1 in 5, and a natural speed of 40 ft. per sec., its rate of vertical descent is 8 ft. per sec.

"The only estimate extant of the flight angle of a bird that can be considered reliable is that of Bretonniere, who, from observations made on a number of storks, concluded that the gliding angle of this bird is 10° , or 1 in 5.7."—*Lanchester*.

20. If the atmosphere in which the flight takes place has a rate of vertical ascent *en masse* of at least 8 ft. per sec., the bird would soar indefinitely without losing altitude (Fig. 6).

21. This velocity may be manifested as an upward trend in an apparently horizontal wind or as a direct vertical ascent of the air in bulk.

Up Currents.

22. In the latter case, the bird cannot hover in a fixed point in space; he must move in order to obtain support. The up current is inadequate of itself to carry the weight of the bird by direct impact under the wing, but when compounded with the natural horizontal flight speed of the bird it completes the essential diagram of forces. (Fig. 7).

23. It is a question for discussion whether the evidence of a falling feather would be proof of the non-existence of an up current in this order of magnitude. Dr. Hankin observed cases in which soaring flight is maintained in an atmosphere through which a feather detached from a bird's breast slowly fell to earth.

24. Because we exist in the proximity of the boundary surface (the earth) to a fluid region (the atmosphere), where relative motion of any magnitude is only possible in a direction parallel to the surface, our common impression of winds is that they are all horizontal.

"Probably, if we had spent our lives at the top of a tower a few thousand feet in height . . . the motion of a vertical wind would not have seemed strange or unusual."—*Lanchester*.

25. In the meteorologist's eye, winds result from disturbances of fluid equilibrium caused by changes in atmospheric density consequent upon differences of local heat, such as are commonly manifest between adjacent regions of land and water that are equally in the direct rays of the sun.

26. Air that is lighter than its environment tends to rise by upward acceleration, causing thereby the colder air to flow in horizontally towards the hotter regions. Up currents are, therefore, the primary cause of the horizontal winds that we are so apt to regard as the only natural mode of air in motion.

"The changes of density due directly and indirectly to the solar heat constitute the mainspring from which all wind energy is derived. . . . Heat energy, whether solar or terrestrial, acts on the density of the atmosphere from point to point, either by change of temperature or by change of water contents, and so gives rise to vertical motion to which the horizontal currents are a counterpart. Thus, in considering the horizontal component of the wind as the first, and the vertical as the secondary and doubtful quantity, we are reversing the order of cause and effect."—*Lanchester*.

27. If the source of heat is maintained, as by the rays of the sun shining in a cloudless sky, a system of circulation is established in the atmosphere such as to leave the hottest region in comparative calm. The cool air sweeps in horizontally toward the hot centre, but does not blow across it. An invisible core of rising air deflects its course, so that the bulk of the horizontal wind flows upwards from afar, and by gradual curvature at length acquires a vertical motion at a considerable height above the ground (Fig. 8).

28. In contact with the ground, air cannot possess any vertical motion, but it may be subjected to the force of an acceleration sufficient to result in a rapid up current at a greater altitude.

"If a column of heated air is but 1° C. hotter than the surrounding air, then its density will be approximately $\frac{1}{3000}$ part less than normal, and if the height of the heated column be 300 ft., the difference of pressure by which it is propelled will be equivalent

to a head of one foot; this, by the principle of Torricelli, corresponds to a velocity of 8 ft. per second, which is more than sufficient to sustain a gliding bird without loss of altitude."—*Lanchester*.

Santos Dumont on a ballooning adventure.

"I pulled the valve rope and let out more gas. I could not go down. I glanced at the barometer and found indeed that I was going up. Yet I ought to be descending, and I felt, by the wind and everything, that I must be descending. Had I not let out the gas? To my great uneasiness I discovered only too soon what was wrong. In spite of my apparent continuous descent, I was, nevertheless, being lifted by an enormous column of air rushing upwards. While I fell in it I rose rapidly higher with it. . . . The upward rushing column of air continued to take me (from a position within 300 yards of the ground) to a height of 3,000 metres (almost two miles). I could do nothing but watch the barometer."—*Santos Dumont*.

29. It is a point for discussion whether the acceleration necessary to maintain an up current of 8 ft. per sec. at an altitude of, say, 100 ft. will or will not necessarily create a perceptible wind at the height of a man's head. In other words, can an observer stand in an apparent calm beneath an up current sufficient for soaring flight.

30. If, owing to the natural pressure of the inflowing winds, the cross-section of the vertical up current contracts with altitude, then the velocity will still further increase with the height above the ground.

31. If this multiplying effect is very considerable, the velocity of the up current will be all the more sensitive to fluctuations in the source of heat. In other words, the soarability of the air may be expected to be readily affected by clouds temporarily occluding the rays of the sun.

32. All observers stationed in apparent calm who have watched soaring flight agree:—

1. That the birds do not begin to soar until after the sun has risen awhile.
2. That all birds make a flapping ascent to an altitude of a hundred feet or so.

"A soaring bird rising in a calm air generally flaps to an altitude of about 100 metres (330 ft.). Arrived at this altitude, he commences to describe his circles, partially flapping, partially gliding, the flaps diminishing as the altitude increases."—*Mouillard*.

S. E. Peal on birds in the valley of Brahmaputra:

"The birds rise by flapping the wings vigorously, and begin to soar when they reach an altitude of from 100 ft. to 200 ft. from the ground. The flight path then consists of a series of large sweeping circular movements of about 150 ft. diameter, rising from 10 ft. to 12 ft. in each lap . . . the birds frequently soar thus to a height estimated at 8,000 ft. The velocity of soaring flight is computed as from 15 to 35 m.p.h. The general trend of the spiral that constitutes the path of flight is to leeward, the loss of position or drift being about 20 ft. each lap."—*S. E. Peal*.

33. It has been stated:

1. That soaring in a calm is impossible.
2. That soaring in a uniform horizontal wind is impossible.
3. That soaring in a uniform wind blowing obliquely upwards is possible.
4. That soaring in an up current is possible.

It remains to state that soaring in a horizontal pulsating wind is possible.

Lord Rayleigh in "Nature" 1893:

The conditions for soaring flight.

"1. The course is not horizontal; or 2. The wind is not horizontal; or 3. The wind is not uniform."

Pulsating Winds.

34. The analysis of soaring in fluctuating wind is complex; it may be illustrated, however, by the simple switchback model, invented by Bazin in 1890, and independently re-invented by Lanchester four years later. (Fig. 9).

35. By suitably sliding the track to and fro, the ball (representing the bird in a pulsating wind) may be lifted from the lower to the higher end, thus demonstrating the transference of energy.

"The total turbulent energy of the air handled, and the energy available according to the switchback theory, for a bird of given weight, both depend upon the existence of a definite relationship between the velocity of wind fluctuation and the velocity of flight."—*Lanchester*.

36. In order to maintain soaring in a horizontal wind, the velocity may fluctuate with time or place. That is to say, if the speed is the same simultaneously throughout the zone, then the velocity must change during the next instant of time, but if the velocity is different simultaneously in adjacent regions, then the speed at a given point may remain constant. In this latter case a bird in moving from one point to another creates its own relative squall.

37. Langley found that the velocity of fluctuation of wind is much greater than hitherto had been supposed. Also, he showed that the proportion of such fluctuation increased with the absolute velocity of the wind. In other words, the higher the wind the greater its gustiness. (Fig. 10.)

"In a high wind, the air moves as a tumultuous mass, the velocity being at one moment perhaps 40 m.p.h., then diminishing to an almost instantaneous calm."—Langley.

Langley on an observation on the Aqueduct Bridge over the Potomac, at Washington City, during a November gale estimated at 35 m.p.h. :—

"In this aerial torrent, and apparently indifferent to it, the bird hung, gliding, in the usual manner of its species, round and round in a small oval curve, whose major axis, which seemed towards the wind, was not longer than twice its height from the water. It swung round repeatedly, rising and falling slightly in its course,

while keeping on the whole on one level and over the same place, moving with a slight swaying, both in front and lateral direction, but in such an effortless way as to suggest a lazy yielding of itself to the rocking of some invisible wave."

38. Meteorology has shown that wind velocities commonly increase with altitude, wherefore the soarability of the air is presumably greater at greater heights.

39. Obvious examples of fluctuation of wind velocity with place occur in the vicinity of obstacles capable of creating a region of dead water on their lee side. Sea waves may do this with a surface wind, and the low gliding flight of some sea-going birds is explicable by this theory. (Fig. 11.)

J. A. Froude on the albatross.

"The flight is generally near the water, often close to it. You lose sight of the bird as he disappears between the waves and catch him again as he rises over the crest . . . He alters merely the angle at which his wings are inclined."

AIR EDDIES.

CONGRATULATIONS to Mr. S. F. Cody on his splendid flight on Saturday last, when he carried four passengers on his five-seated biplane. About 7 miles were covered, during which the height was mostly about 100 ft. A photograph of the "crew" appears on p. 108.

Mr. Cody must also be congratulated on his success in the friendly "dust-up" between his "cathedral" and the silenced aeroplane produced by the Army Aircraft Factory. The pilot of the army flyer was Mr. De Havilland, and over the course of about a mile and a half he was beaten by about a couple of hundred yards. The weather was very windy, and both pilots and passengers had an exciting time. The two flyers were started by the falling of a flag, and an interested observer at the winning post was Mr. Harold E. Perrin, Secretary of the Royal Aero Club.

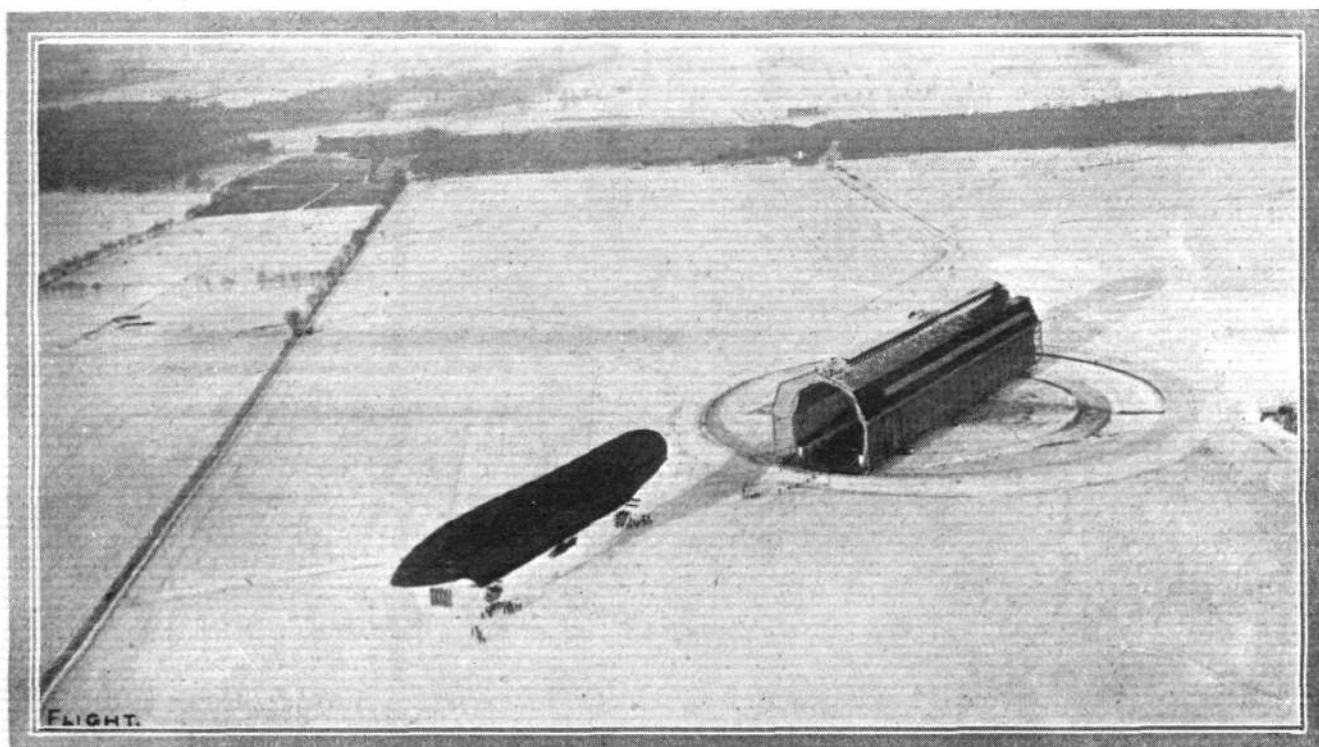
Eminently practical is the present which I hear is to be given to Col. Huguot, the military attaché, who is leaving the French Embassy. Frenchmen in London have decided to give him an aeroplane as a token of their esteem and regard.

A few details are to hand from South Africa regarding the flights by Driver and Compton Paterson. On December 23rd, Paterson was in the air for 19½ minutes on his own biplane and covered about 20 miles, getting up meantime to a height of 4,000 ft. In a preliminary flight he had been up the height of 400 ft. in a couple of minutes. Driver had the Blériot out for eight minutes, the speed being a little over 60 miles an hour and getting up to a height of

2,500 ft. Christmas day saw Paterson taking the machine from Kenilworth to the Green Point track, following a circuitous route, and in the 35 minutes he was aloft covering 30 miles, part of the time being over Table Bay.

His smash on Boxing-day was caused by a sudden gust of wind when flying from an unsuitable ground. The morning was not a good one from a flying point of view, there being a strong breeze high up with plenty of *remous* near the ground. When the machine was crossing some trees bordering the cement track it was caught on the left-hand side by a gust of wind and brought down with a crash. It was feared that Paterson had fared rather badly, but a thorough examination at the Somerset Hospital showed that beyond suffering from a severe shock and a few bad bruises there was nothing seriously wrong. Driver abandoned his proposed attempt to fly from the track, but on the following day flew between Kenilworth and Muizenberg, carrying the first South African aerial mail.

Sippe was very unfortunate in his mishap on Monday. He has been waiting at Abingdon for a favourable opportunity to fly the Avro back to Brooklands, and on Sunday got to Finchampton in 29 mins., then having to come down owing to a block in the petrol pipe. Apparently the engine did not enjoy the over-night frost, and it proved in a petulant mood on Monday morning. A good start was made for Brooklands, but after a quarter of a mile a sudden descent had to be made, with no good results to the biplane, but the pilot was unhurt. "OISEAU BLEU."



A snap received from Lady Shelley from "Parseval VI," of the Siemens-Schuckert airship, owned by the Siemens-Schuckert Electrical Co., showing the Siemens-Schuckert ready to re-enter its rotating shed.

The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

Annual General Meeting.

The Annual General Meeting of the Members of the Royal Aero Club of the United Kingdom will be held on Thursday, March 21st, 1912, at 4 o'clock, at 166, Piccadilly, London, W.

Notices of motion for the Annual General Meeting must be received by the Secretary not less than twenty-one days before the meeting, and must be signed by at least five members. Thursday, February 29th, 1912, is the last day for the receipt of notices of motion.

Committee.

In accordance with the rules, the Committee shall consist of eighteen members. Members are elected to serve for two years, half the Committee retiring annually. Retiring members are eligible for re-election.

The retiring members of the Committee are :—

Ernest C. Bucknall.	Sir Charles D. Rose, Bart.,
Col. J. E. Capper, C.B., R.E.	M.P.
G. B. Cockburn.	A. Mortimer Singer.
E. Manville.	Hon. A. Stanley, M.P.
J. T. C. Moore-Brabazon.	R. W. Wallace, K.C.

Any two members of the Club can nominate a member to serve on the Committee, having previously obtained such member's consent. The name of such member so nominated, with the names of his proposer and seconder, must be sent to the Secretary in writing not less than fourteen days before the Annual General Meeting. Thursday, March 7th, is the last day for the receipt of nominations.

Members are reminded that a ballot paper for the election of nine candidates to seats on the Committee of the Club will be forwarded to them at least seven days before the date of the Annual General Meeting.

Committee Meeting.

A meeting of the Committee was held on Tuesday, the 30th January, 1912, when there were present :—Mr. R. W. Wallace, K.C., in the Chair, Mr. Ernest C. Bucknall, Col. J. E. Capper, C.B., R.E., Mr. G. B. Cockburn, Col. H. C. L. Holden, C.B., R.A., F.R.S., Prof. A. K. Huntington, Mr. Alec Ogilvie, Mr. Mervyn O'Gorman, Mr. C. F. Pollock, Sir Charles D. Rose, Bart., M.P., and Harold E. Perrin, Secretary.

New Members.—The following new members were elected :—Brian Mawson Dodds, Alfred Dukinfield-Jones, Ronald Campbell Kemp.

Aviators' Certificates.—The following Aviators' Certificates were granted :—

176. Lieut. Alan Geoffrey Fox, R.E. (Bristol Biplane, Salisbury).
177. Lieut. Eric Mackay Murray (Bristol Biplane, Salisbury).
178. Giovanni Sabelli (Deperdussin Monoplane, Brooklands), subject to sanction of Aero Club of Italy.

Competitions Committee.

A meeting of the Competitions Committee was held on Wednesday, January 31st, 1912, when there were present : Prof. A. K. Huntington, in the Chair, Mr. F. P. Armstrong, Mr. Ernest C. Bucknall, Mr. G. B. Cockburn, Col. H. C. L. Holden, C.B., R.A., F.R.S., Major F. Lindsay Lloyd, Mr. Alec Ogilvie, Mr. Mervyn O'Gorman, and Harold E. Perrin, Secretary.

Certified Trials.—The Regulations for Certified Trials to be carried out by the club were drafted.

Army and Navy Aviation Prizes. (Presented by Mr. A. Mortimer Singer.)

Army ... £500 Navy and Marines ... £500
Intending competitors are again reminded that this competition will close on March 31st, 1912.

The following are the performances so far recorded :—

Army.—July 17th, 1911. Late Lieut. R. A. Cammell, with passenger. Blériot monoplane, 70-h.p. Gnome motor. Distance 100 miles.

January 29th, 1912. Lieut. B. H. Barrington-Kennett, with passenger. Nieuport monoplane, 50-h.p. Gnome motor. Distance 111 miles.

Navy and Marines.—August 16th, 1911. Capt. E. L. Gerrard, R.M.L.I., with passenger. Short biplane, 50-h.p. Gnome motor. Distance 129 miles.

These are approximate distances, and will be subject, if necessary, to verification.

British Empire Michelin Cup No. 2, £600.

This prize may now be competed for, and the rules and entry form can be obtained from the Club.

British Empire Michelin Cup No. 1.

The rules for the British Empire Michelin Cup No. 1 have now been drafted, and it is hoped that these will be published in next week's notices.

Presentations to Club.

Mr. A. W. Ruthven-Stuart has kindly presented to the Club a large photograph of Mr. C. Grahame-White flying at Hendon.

The Club has been presented with a letter bearing the postmark of 1847, and written on notepaper with an engraving depicting the "First Aerial Steam Carriage" flying over the River Thames. This letter was a gift from the collection by Mr. H. L. Ewen, of Norwood, to Major F. Lindsay Lloyd, who has very kindly presented it to the Club.

Gordon-Bennett Aviation Cup.

The cup having been won by a representative of the Aero Club of America, the race for 1912 will take place in the United States. The exact time and place will be announced later.

At the recent Conference of the Fédération Aéronautique Internationale in Rome, it was decided that the course is to be a closed circuit with a minimum of 5 kilometres, and the total distance to be flown is 200 kilometres.

Each club affiliated to the Fédération Aéronautique Internationale has the right to challenge the holder, the Aero Club of America, and such challenge must be sent in before March 1st, 1912.

The Committee of the Royal Aero Club will select the three competitors to represent the British Empire, and intending candidates are requested to notify the Secretary on or before February 15th, 1912, of their willingness to compete, if chosen. Applications must be accompanied by a cheque for £20, the entry fee, which amount will be returned should the entrant not be selected.

166, Piccadilly.

HAROLD E. PERRIN, Secretary.

ROYAL AERO CLUB FLYING GROUND, EASTCHURCH.

DULL windy weather prevailed for the greater part of last week, but this did not prevent the new naval pupils getting in a good deal of practice. On Wednesday, Engineer Lieut. Randell, R.N., made a number of straight flights on the Short No. 38, with considerable skill for a beginner, his landings being very well managed. Lieut. L'Strange Malone, R.N., who is the latest naval pupil to arrive at Eastchurch, also made some passenger flights with Lieut. Gregory, R.N., on the Short triple twin-engined machine.

During the week Capt. Gordon, R.M.L.I., made an exceptionally fine flight in a very strong wind, and although it was unusually "bumpy" he remained aloft for 1½ hours, at the end of which he came down nearly frozen with the cold, but satisfied with the valuable practice he had had of rough-weather flying.

On Sunday a remarkable change occurred in the weather, the strong winds and stormy cloud conditions changing to a clear blue

sky with scarcely a breath blowing. Mr. Alec Ogilvie was out early on the N.E.C.-engined Wright biplane and continued to fly at intervals throughout the day, during which he made some interesting glides, one especially at a very flat angle with his engine shut off completely.

A number of the Territorial London Balloon Company were also down for the week-end in charge of 2nd-Lieuts. Cockerell and Barrington-Kennett, and under the excellent tutelage of Travers some good flying was got through. Passengers who made their first flight during the day were Sapper Meredith, who was taken for a 10-minutes' flight by Travers the instructor, and Driver Brewer, who was taken up by Lieut. Cockerell for a similar period. Lieut. Barrington-Kennett made a long flight on the Short No. 32, doing some neat banking at just the right angle.

The Jezi biplane, piloted by its designer, was going very strong indeed, Jezi, by dint of very careful adjustment of his motor, having

succeeded in increasing his propeller speed by nearly a hundred revolutions, which made, of course, a noticeable effect on the speed and climbing powers of the machine.

On Sunday, Valentine arrived at Eastchurch on a Deperdussin monoplane about 4 p.m., and after a short stay motored back to town.

Early on Monday morning last the weather conditions were good for flying, although the very low temperature (some degrees below freezing point) was not altogether ideal for comfortable flying. In spite of this, however, Commander Samson, R.N., and Lieut. Gregory, R.N., made two excellent flights, the former, with



FROM THE BRITISH FLYING GROUNDS.

Royal Aero Club Flying Ground, Eastchurch.

THE report for the week follows the official notices on page 105.

Brighton-Shoreham Aerodrome.

On Thursday last week the 25-h.p. Anzani-Blériot was brought out by Kent, who put in a short time at rolling practice, while Chanter was continuing the test of his new monoplane. Lieut. Walter Lawrence arrived with the Gnome-Blackburn monoplane, which has been placed at his disposal pending the completion of the passenger machine the Blackburn Company has on order for him.

On Saturday the machine was ready for working, and Lieut. Lawrence took his seat in the machine and had a roll over the ground, then did a straight flight. This was his first experience in the monoplane.

Sunday being an ideal day for flying, the Blackburn was brought out early, and Lieut. Lawrence did a little practice in her, getting accustomed to the control, and putting in some good work. During the morning Mr. B. C. Hucks took the Blackburn in hand, and, rising very quickly into the air, made several splendid circuits, but had to come down on account of the carburettor freezing, and alighted on a piece of land outside the aerodrome. After lunch, Mr. Hucks flew back into the aerodrome and did a very fine flight. He then took Mr. Blackburn up as a passenger.

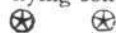
Next day Lieut. Lawrence did straight flights, making excellent progress with his new mount. The Collyer-England machine has been out with a Green engine, but is not tuned up to the satisfaction of her owner yet.

Tuesday was a very busy afternoon. Lieut. Lawrence getting the Blackburn out, and rising very quickly from the ground, covered three 5-mile circuits in splendid fashion, climbing to an altitude of 1,000 ft. He *vol planed*, and landed very easily. The Collyer-England was brought out, and some good work put in. Mr. Chanter had his new monoplane out, but after doing several runs could not get the engine to work properly. The 25-h.p. Anzani-Blériot was also brought out, but only did rolling practice, as the engine was not working satisfactorily.

Brooklands Aerodrome.

WEDNESDAY of last week was a bad day for flying, but Kemp took out the new Vickers No. 3 for straight flights. Machine did not exhibit that steadiness which is usually considered desirable, but seemed fast and got off the ground all right. Percival flew for about twenty-five minutes on his biplane, doing exceedingly well. He is to be congratulated upon his new production. Kemp then

Engineer-Lieut. Randell, R.N., as a passenger, remaining aloft for over two hours on the Short tandem twin machine, whilst Lieut. Gregory with Lieut. L'Strange-Malone, R.N., as a passenger, kept going for over three hours on the triple twin machine. Whilst these flights were being made the wind got up considerably. Lieut. Gregory, who kept at an elevation of some 1,000 ft. found the wind very choppy, but especially so when nearing the coast line and meeting the incoming currents from the sea. On landing, he remarked upon the great stability of the "triple twin" under such flying conditions.



flew some straights on the Flanders, getting used to the warp and to slight alterations made since last he flew her. As the engine was short of "revs.," machine was taken back to shed.

At the Bristol school Merrian flew solo with good right and left-hand turns. Pizey then took up Weeding for instruction, he making good progress, and subsequently making first solo flight. A plug broke when Merrian was out, so machine was brought back.

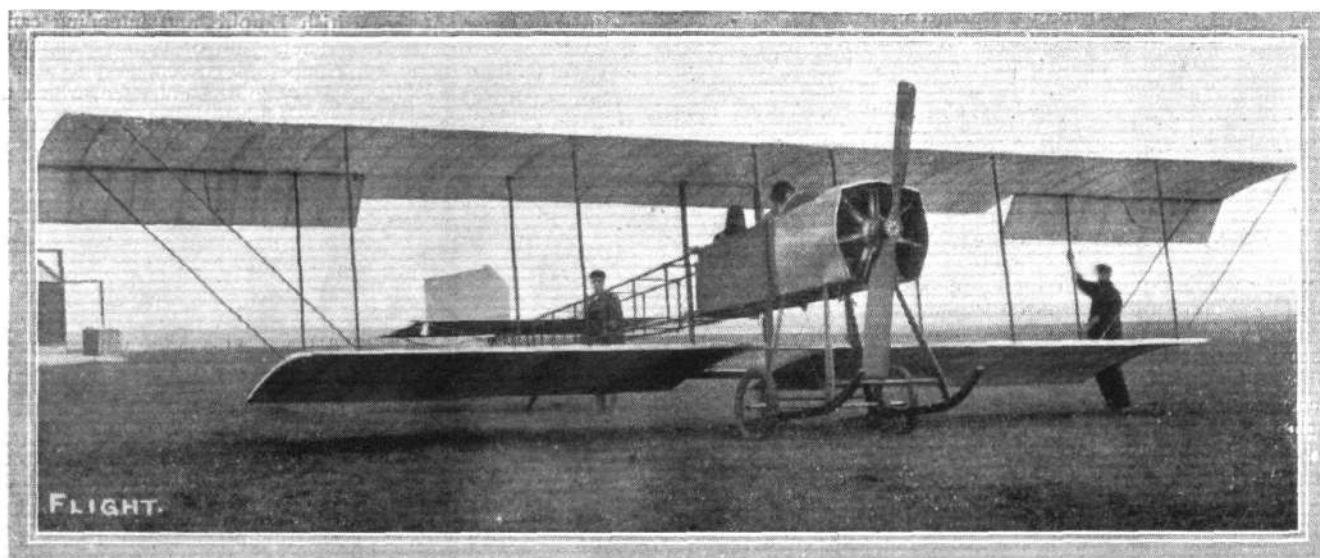
On Thursday, Knight flew some straight lines on the two-seater Vickers, while at the Deperdussin school a new pupil, Partridge, was practising on the taxi, also Gill, brother of Lieut. Gill, who obtained his ticket at this school, was doing short straight flights. Then Sabelli passed his certificate tests, flying in excellent style. Percival was up in the afternoon, going strongly. The Flanders again did some straights, but the engine was not doing its best. Pizey was up with Capt. Nesham, then with Lane.

No flying on Friday beyond a test flight by Pizey on the Bristol.

A strong N.E. wind prevailed on Saturday, and the only one out was Partridge making short straights on the Deperdussin. Petre "the Monk," by the way, has now been appointed head pilot of the Deperdussin school.

Sunday was a day of great things, perfect flying weather prevailing the whole day. Sopwith had his 70-h.p. tandem two-seater Blériot out for the first time since its arrival here, and did some magnificent flying, bordering most of the time on the sensational. At times he would switch off and dive to within a few feet of spectators' heads, giving all and sundry bad attacks of "cold feet." Hamel then took the machine up to about 2,000 ft., putting in some very pretty figures. Pizey, on the Bristol, indulged in some trick flying, especially when with Mrs. Grey and Jones as passengers. Spencer did some good work, and was up for a considerable period. Sopwith was also up again with Lang, Charteris, and a lady-passenger at odd times. Beatty flew some straight lines on the Vickers, while Percival did circuits. Kemp was out for a few short flights on the Flanders, the engine of which was only giving a low number of revolutions, and therefore the machine was not flying well. During that time he did a very fine piece of piloting, going through the back draught of two machines by accident, and managing to do a turn at the bottom of the ground. At the Bristol School, Smith was making short straights, Weeding good solos, also Lane, while Merrian flew some figures of eight. Capt. Weeding flew well, but on landing managed to break one of the chassis struts. Pizey then took up Lieuts. Burnay and Phillips, new pupils, for passenger trips.

Monday also was a remarkable day. Things were quiet in the morning, but Mrs. Hewlett was flying the Hewlett-Blondeau

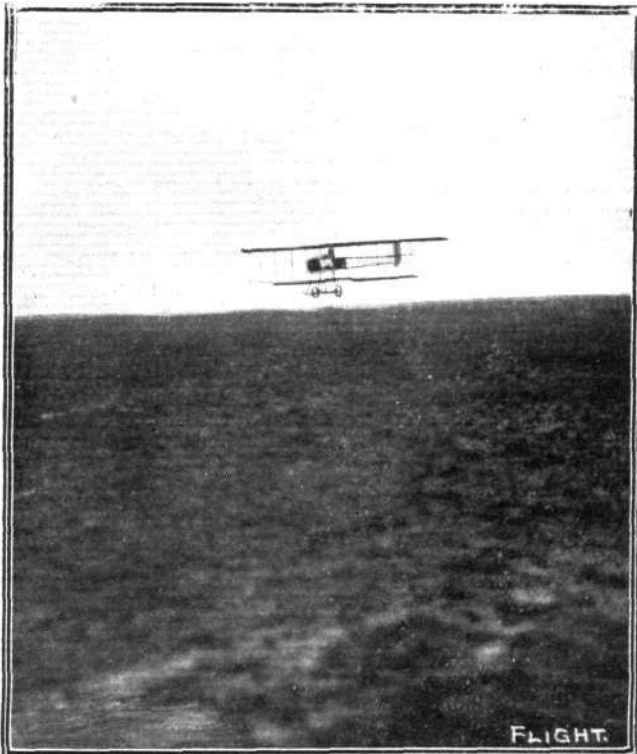


The Short tractor biplane, constructed by Messrs. Short Bros. for Mr. Frank K. McClean, which has been doing successful work at Eastchurch recently.

biplane, and Partridge making hops on the school "Dep.", was showing great progress. Pizey was out giving instructions to Lieut. Carfrae for 15 mins., while Weeding did 8's, and Smith, Lane and Nesham flew straights. Raleigh was up later with Pizey, then Weeding did solos, and Merrian 8's. In the afternoon the sudden appearance of Cody on his machine caused great interest. After gliding down for some distance at a very fine angle, he switched on his engine, as he was not certain of reaching the aerodrome and did not want his propeller to stop turning. Everyone was anxious to examine his machine, which is the old one he had at the Lanark meeting, but which has been fitted with a 120-h.p. Austrian Daimler engine. On coming to ground it was found that he had again stripped some of the fabric from one of the rudders, through the terrific propeller draught. While this was being remedied, Sopwith took his 70-h.p. Gnome-Blériot out, and flew circuits in fine form with Cody as passenger, giving exhibitions of the diving and climbing powers of his machine. When Cody's rudder was repaired he started off, making the machine climb at an appallingly steep angle. It certainly is an incongruous sight to see a big heavy-looking biplane climb more steeply than any light single-seater monoplane. It was no freak angle owing to abnormal speed on the ground, but continued until he was about 400 ft. up, when he throttled the engine down and turned, coming back over the heads of the spectators. He then dived slightly and left hold of the controls. On returning to ground, a discussion arose between Cody and Sopwith on the speeds of their respective machines, so a most interesting trial ensued. It then appeared that the Cody machine was actually faster than Sopwith's, which does about 65 m.p.h., so the biplane's speed must very nearly approach 70 m.p.h. Cody next proceeded to simultaneously take as passengers three of our best known pilots, namely Gilmour, Sopwith and Valentine, who appeared to thoroughly enjoy their trip. He then set off home with Young as passenger, getting his altitude in a very short while. We hear later that he got to Farnborough in eight minutes!

There was a rival attraction to flying to-day, namely, skating. A few enthusiasts were on the ice till midnight, one of them, Pizey, having the misfortune to fall in up to his neck. A change of clothes, however, was procured from the Heath Club, when he resumed skating. The arrival of Lang's wind waggon, fitted with Gnome and propeller, proved a great success and gained laurels as a passenger carrier, going round the track with five up at about 55 m.p.h.

On Tuesday, Partridge was flying straights on the Deperdussin, having made remarkable progress; also Gill, on the other machine. All the Bristol pupils were out, Merrian flying his figures of 8 for his tests, but failing on the landing. When Partridge was over the sewage farm his engine failed him, causing him to drop into that salubrious spot. Luckily the frost had hardened the surface, and the only damage was a broken strut.



Mr. Frank McClean in flight at the Royal Aero Club's Eastchurch flying grounds on his Short tractor biplane.



Giovanni Sabelli and the 30-h.p. Anzani-engined military Deperdussin racing monoplane. Signor Sabelli is the first Italian to secure his *brevet* at Brooklands. His *vol planés* are executed in exceptionally fine style.

Freshfield Aerodrome, near Liverpool.

AFTER a seemingly interminable succession of gales and storms, a few fairly calm days during the last week have enabled Planes, Ltd., to continue their experiments with their new type of monoplane. With Fenwick at the wheel the machine gives every indication of being a success. Though nothing sensational has been attempted, altogether considerably over a hundred miles have been flown without any faults developing, and the numerous starting and landing tests show that the simple chassis and entire machine are thoroughly up to their work. Although up to the present the trials have as far as possible been kept secret, something is likely to be heard of this machine in the near future.

London Aerodrome, Collindale Avenue, Hendon.

Grabame-White School.—Very windy weather on Wednesday last week kept the pupils in the workshops all day. A splendid day followed on Thursday, the school being at work from early morning till dusk, three of the school machines doing continuous work. Most of the pupils were present morning and afternoon, under the direction of Lewis Turner, who started the day's work on biplane No. 2, followed by Biard doing good straights on No. 3, Fowler doing circuits on same machine, but had to descend for ignition plugs to be changed. Turner then took up the machine for test, found engine running well, so turned it over to Raphaite for rolling practice; and at intervals during the day the machine was used for straights by Lieut. Stopford, Major Liles, and Biard. Fowler and Turner also had biplane No. 1 out, the former making straights and Turner testing the engine and making circuits at intervals. In the afternoon Turner was out on No. 2 machine, taking up in turn Major Liles, Lieut. Stopford, Biard, and Fowler for instruction in making right and left-hand turns.

Theoretical instruction only was given on Friday, and next day was too gusty for air work.

Sunday was a fine day, and Turner and Gates were early upon the scene with biplane No. 1 for a couple of hours, Turner making some fine circuits, and Gates straights with good landings. Grahame Gilmour arrived during the afternoon, and taking out the Martin-Handasyde made some splendid flights, banking in fine fashion.

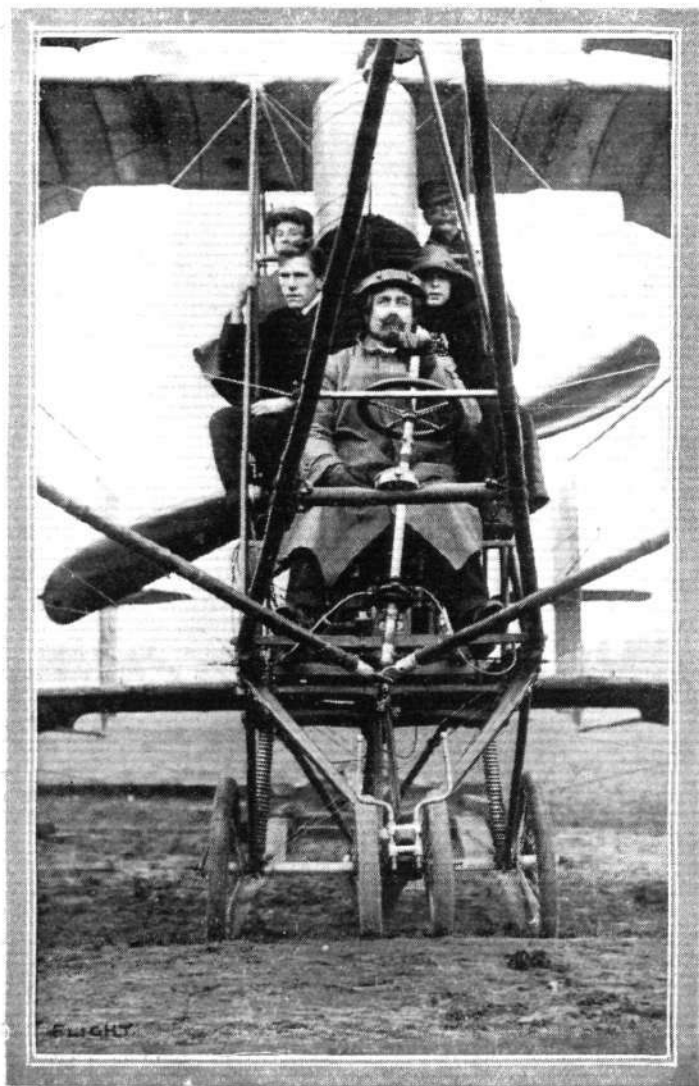
Lewis Turner was out making circuits on Monday morning on No. 2 biplane, but had to discontinue owing to rising wind, and the school then adjourned for theoretical work. In the afternoon, however, the wind dropped somewhat, and Clement Gresswell, chief instructor, had biplane No. 2 out for several circuits, flying at a height of about 400 ft., afterwards taking up as a passenger, for three circuits, Miss Campbell. He was followed by Fowler, who continually flew circuits till dark. During the afternoon Raphaite, Biard, Major

Liles, and Lieut. Stopford were all busy putting in straight flights on biplane No. 3, the day's work being finished by Lewis Turner flying the old school 'bus once round the aerodrome and back to its hangar.

The day's work commenced on Tuesday by Biard taking out biplane 3, and putting in 15 mins. at straights. Turner then took out biplane No. 2, and mounting to about 100 ft. made several circuits; he then turned the machine over to Fowler, who was making good circuits with right-hand turns; Raphaite was also out rolling. In the afternoon Turner also put in some good circuits, after which the pupils adjourned for theoretical work.

A.S.L. Flying School.—On Wednesday morning last week a 30 mile-an-hour wind prevented outside work, but towards evening it turned to a calm, and Mr. Barber brought out the Gnome Valkyrie racer in ideal conditions. He flew circuits in his usual excellent style, and made numerous flights before dark. Again, on Thursday, weather conditions were good, and in the afternoon Ridley-Prentice was flying circuits on the Green-engined Valkyrie at an altitude of 200 ft. The A.S.L. works were busy testing various propellers on the Viking biplane.

Sunday proved a magnificent flying day, and during the whole afternoon Mr. Barber was flying his Viking biplane fitted with A.S.L. propellers. He went up several hundred feet and described some very small circles. A very interesting test was made, straight fabric balancers having been fitted to the machine in place of the patent cambering balancers designed for this biplane. Mr. Barber found a very marked difference in the lateral control of the machine, proving conclusively that the cambering surfaces possess wonderfully greater efficiency. During the course of the afternoon, Mr. Barber made innumerable ascents terminating the day's work with a splendid flight of 20 minutes duration, making many sharp turns with fine banking, his final glide from a good height being very effective.



Mr. S. F. Cody and his freight of four passengers, Miss Buckoke and Messrs. Hayes, Dackett, and Frank Cody, totalling to 738 lbs., with whom he flew last Saturday afternoon at Aldershot at a height of about 70 to 80 ft. on his new 'bus for a distance of about 7 miles.



Mr. Graham Wood, Lecturer at the Polytechnic, who has just passed for his pilot's certificate at the Hewlett-Blondeau Flying School at Brooklands.

Blériot School.—On two days last week, Wednesday and Thursday, it was possible to do some useful work at the school, all the pupils practising with great keenness. Messrs. Allen, Desoutter and Prensziel, who are only waiting a fine day to obtain their certificates, were doing excellent circuits, landing in *vol plané* in true professional style. Messrs. Clappen, Pothe, Welburn and Morris were putting up good straight lines, and starting to get off the ground. They are making excellent progress; a week or so of calm weather and they will be practically ready to attempt the trials for their *brevets*. The remainder of the week the weather was too bad for any outside work.

W. H. Ewen School.—The pupils at the W. H. Ewen school have, during the past week put in an exceptional amount of practice, which is well reflected in the capital progress they are all showing.

The system of teaching in operation at the school is such that each pupil is taken individually, and thoroughly masters each lesson before leaving the machine; and this system is proving its worth by its quick results.

Mr. E. H. Lawford has now gained every confidence in his controls and handles the Blériot exceedingly well, while MM. Dubois and Baumann have made excellent straight flights, sometimes in an 8—10 mile wind. Capt. Loraine and Mr. T. Warren have been making some good flights with right and left turns on the Blériot, while on Thursday they both did two fine trips on the Dep. with well-judged landings.

On Wednesday, Ewen was out on the Dep. for half-an-hour, circling round Edgware and Old Hendon, while on Thursday he put up a splendid exhibition in which his 28 Anzani behaved remarkably well. Making in all six flights, his total time in the air exceeded two hours with an average height of 800 ft. In his various trips he covered the surrounding country to Finchley, Elstree and Hendon, landing with some fine spiral *vol plans*, and at one time doing a straight with his hands above his head.

On Sunday, Ewen was out twice for half-an-hour and 20 minutes respectively, when he did some flying which was exceptionally good for his 28 Dep. Rising rapidly, he took his turns by diving and banking in an almost alarming manner and finished up with very fine spirals. Although the wind was blowing from 14 to 17 miles per hour on Tuesday, Ewen was out twice on the 28 Dep.

Salisbury Plain.

Air Battalion—Wednesday of last week was a fair flying day, although it was a bit misty, and the Air Battalion put in a hard day's work. Lieuts. Conner, Manisty, and Fox were each out in the morning on Bristol biplanes, and Lieut. Barrington-Kennett took the Nieuport to a height of 700 ft, making several circuits round Farge, Stonehenge, and Nitin Downs. Later in the morning Lieut. Fox got into his Bristol biplane again and made the test flights to secure his *brevet*.

Mist and rain made the conditions anything but cheerful on Thursday, but Lieut. Barrington-Kennett was out early in the morning on a Bristol biplane, and Lieuts. Conner and Fox also put in some good scouting practice. Lieut. Barrington-Kennett also opened the ball on Saturday, first taking his Nieuport monoplane out, and then the Bristol biplane. Capt. Fulton, Lieuts. Conner, Fox, and Manisty were also flying well on biplanes. On Sunday morning a Bristol two-seater monoplane was put through some tests, having to climb 1,000 ft. in five minutes, and 2,000 ft. in twelve minutes, which proved an easy task with the machine, with M. Prier at the helm, accompanied by Lieut. Manisty as passenger. Lieut. Barrington-Kennett had his Nieuport machine out for a practice flight. On Monday morning, Capt. Fulton had brought out the Bristol monoplane again, and M. Prier, with Lieut. Manisty on board, got the machine off the ground in 85 yards, quickly rising to a height of 2,000 ft. He planed down, but unfortunately in landing a skid was broken. The machine behaved splendidly in the air, and was very fast. Lieut. Barrington-Kennett, with Lieut. Hynes as passenger, set off to fly for the Mortimer Singer prize on his Nieuport monoplane. Although the weather was misty and very cold a very fine performance was made, 110 miles being covered on a 10 mile course in 2h. 2m. 50s., the late Lieut. Cammell's record being beaten by 10 miles. The flight could have been continued but for the treacherous winds which rendered it advisable to come down. Capt. Fulton and the other officers put in some useful scouting practice over the plains, and Lieut. Conner did some rolling on the Blériot two-seater. Lieut. Fox, Lieut. Barrington-Kennett, and Lieut. Manisty were all out on Tuesday morning, but the two last-mentioned officers had some trouble with refractory engines. Capt. Fulton was out on his Deperdussin monoplane, and Lieut. Conner was up on the Bristol.

Bristol School.—On Monday, last week, five pupils were performing solos, these being Lieut. Murray, who made six flights in final preparation for his *brevet* tests, Lieut. Brodigan, who was up three times, Lieut. Ashton twice, Mr. Smith-Barry (an ex-pupil)

twice, and Bendall four times. Jullerot made four flights, and Fleming two, on one of which he took Lieut. Ashton as passenger.

Next day, Fleming made one flight, but weather was too bad for further work, and the day was profitably employed in the sheds.

Fleming made a trial on Wednesday, afterwards taking Mr. McLeod (an Australian visitor) and Mr. Roger Harrison successively as passengers. Lieut. Murray made two flights, and afterwards satisfactorily passed the tests for his *brevet*, observed by Lieut. Hynes and Lieut. Conner. Jullerot flew with Capt. Gilbert, of the Italian Army, to Shrewston on a biplane, and then took Mr. Roger Harrison for his initial lessons. Capt. Gilbert did two good flights on biplane No. 66, after which Instructor Harrison gave Mr. Roger Harrison another lesson, and Bendall finished the day's work with a solo.

Rain and wind prevented work all the morning on Thursday, but at 2 p.m. Fleming made a trial and found things satisfactory. Jullerot took up Mr. Roger Harrison, and Capt. Gilbert did another good flight. Randall made one solo, and Prier put up a fine flight on a new military monoplane.

A high wind on Friday prevented much flying, and Jullerot, who took Lieut. Roger Harrison for a passenger flight, deemed it wise to suspend the day's work. Prier, however, impervious to the elements, took out the new War Office machine for trial, and made an excellent flight of considerable duration.

The weather being fine on Sunday, the opportunity to put in a hard day's work was taken, and the pupils entered into their work with a zest, rivalled only in keenness by the winter air. Jullerot took Lieut. Roger Harrison for tuition, and then this pupil taking the controls made an excellent flight. Hotchkiss then took up Herbert Thomas, and Dacre, an old pupil, made a solo, and showed that he had not forgotten how to fly. Lieut. Ashton and Capt. Gilbert then made three solos. Prier made several trials on the War Office machine and reached 1,000 ft. in 5 mins.; 2,000 ft. in 11 mins; and 3,000 ft. in 18 mins., the whole flight being of an hour's duration.

Aeronautical Society. First Associate Fellows.

THE following is the result, in alphabetical order, of the first ballot for Associate Fellowship of the Aeronautical Society:—

H. Barber.	W. O. Manning.
Griffith Brewer.	Mervyn O'Gorman.
Capt. A. D. Carden.	Alex Ogilvie.
T. W. K. Clarke.	F. Handley Page.
J. W. Dunne.	Prof. J. E. Petaver, F.R.S.
R. L. Howard Flanders.	Horace L. Short.
Prof. A. K. Huntington.	Capt. M. S. Sueter, R.N.
Leo Jezzi.	Lieut. N. S. Osborne, R.N.
J. H. Ledeboer.	Lieut. C. M. Waterlow, R.E.
Archibald R. Low.	E. T. Willows.

How "Flight" Travels.

SOME idea may be gained of the estimation in which FLIGHT is held by those who take intelligent interest in its pages by the following extract, one of hundreds which reach us almost daily, from a communication to hand from a prominent business man in New York when renewing his subscription. He writes:—

"It may interest you to know that the copies which you send me are re-mailed to a friend on the Pacific Coast, with whom I collaborated at one time in aeronautical experiments, and that they are sent by him to the Stevens Institute of Technology for their reference library, as he is a graduate of that institution. This makes the total distance travelled for each copy of FLIGHT about 11,000 miles—from England to New York, out to California, and back across the continent again to New Jersey. Let me again assure you of the interest with which I look forward each week to the receipt of your valued publication."

All's Well that Ends Well.

ACCORDING to a cable from New York, the Aero Club of America has de-

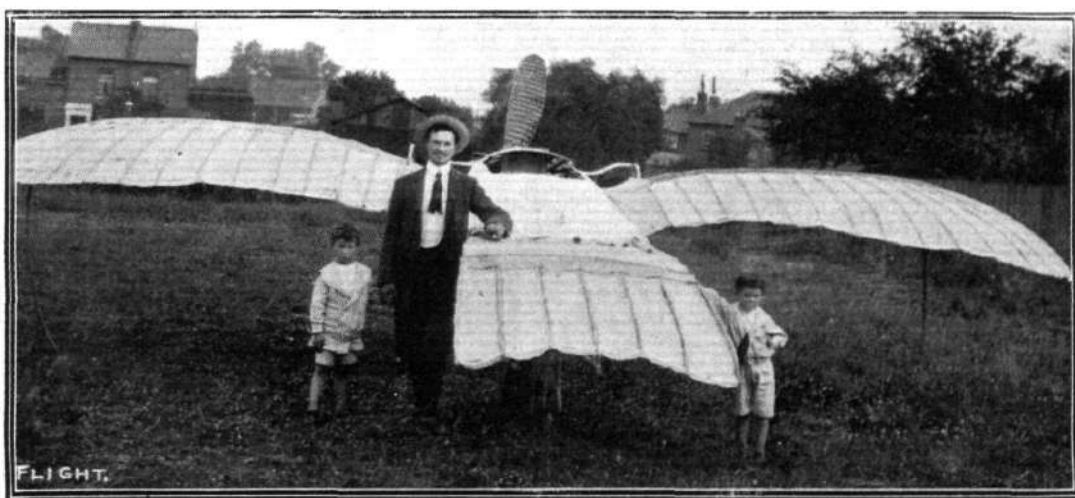
cided to pay the sum of £2,000, being the Statue of Liberty prize, to Mr. Claude Grahame-White upon his producing a document from the Fédération Aéronautique Internationale authorising them to do so.

An Irish Lake for Hydro-aeroplanes.

MRS. LILIAN E. BLAND, *apropos* of the unseemly Windermere hubbub, writes as follows: "By the way, if hydro-aeroplanes are not allowed on English lakes, I would suggest Loch Neagh as the finest sheet of water anyone could have for the purpose; the lake is 30 miles long, and there are very few boats on it."

Wire for Aeroplanes.

MESSRS. W. N. BRUNTON AND SON, of Musselburgh, Scotland, make a speciality of wires for use in connection with aeroplane and dirigible work. They publish a useful little catalogue which, besides giving full particulars of their products, contains a quantity of information on the subject of strength of wires. Messrs. Brunton and Son will be pleased to send a copy to any of our readers who requires one.



M. B. Passat and his monoplane "Sea-gull," which was tried at Brocklands last summer, and since then, owing to engine trouble, experiments have been delayed. He expects to take the machine to Brooklands again soon to resume his attempts at flight. The wings can be closed in five minutes ready for transit. M. Passat's ambition is to bring out a machine which will hover for long distances with the engine stopped.

FOREIGN AVIATION NEWS.

Ae.C.F. Prizes Awarded.

AT a meeting of the Aero Club of France's Aviation Committee last week it was decided not to make any award of the prize of 10,000 francs offered for improvements in aeroplanes. It was also decided not to award the similar prize for improved landing chassis, but three smaller prizes were awarded under this head, *i.e.*, 5,000 francs to M. Breguet, 3,000 francs to M. Esnault Pelterie, and 2,000 francs to M. Maurice Farman. The Coupé d'Aviation des Sociétés affiliées à l'Aero Club de France, was awarded to the Société des Anciens Aerostiers Militaires.

Aviators at Nice.

WHENEVER the weather has permitted recently, the our flyers who have made their winter headquarters at Nice have given very good displays. Perhaps the most prominent is Laurens, who on his Deperdussin monoplane last week took several passengers including a couple of ladies over the town. Fine flights have also been made by Poumet on a Morane and Count Robillard-Cosnac and Roger Morin. At the invitation of M. Camille Blanc, Laurens on Monday, flew over the parade of motor cars and dropped a bouquet in the Palace grounds.

A French Regiment of Aviators.

THE new French Minister of War is losing no opportunity of showing that he is fully alive to the value of military aviation, and the idea is now to create a regiment of aviators. Of course, the regiment would be distributed in companies at the various aerodromes which are to be formed near each military centre. The scheme, it is said, has already been approved by the French President.

The Anzani "Jeton d'Or."

M. ANZANI has renewed his prize, known as the "Jeton d'Or," for 1912, although one or two alterations have been made in the rules. It will be reserved this year for machines fitted with Anzani motors, and the holder will receive 25 francs a day up to December 31st, 1912. The course will be a single journey between Paris and Bordeaux in either direction, the starting point being within 50 kiloms. of either Paris or Bordeaux, while the specified landing places are respectively Issy and the military camp of Bordeaux. Competitors will be classed according to average speed, and the carrying of a passenger will secure a time bonus of ten per cent. The maximum time for the course is ten hours.

The Voisin Canard Visits Buc.

ON the 25th ult. Colliex, on one of the Voisin Canard biplanes, accompanied by Rugere, flew over from Issy to Buc, where some experiments are to be carried on over the lake.

French Officers Deccrated.

BEFORE the assembled troops at Vincennes, on the 25th ult., Capt. Echman and Lieuts. Maillert and Yence were presented with the Cross of the Legion of Honour.

Brindejonc Still After Height Record.

AT Pau, on the 25th ult., Brindejonc des Moulinais had another

try for the height record on his Morane-Saulnier monoplane, but after getting up to 2,500 metres he was obliged to come down.

The English Pilot at Buc.

GORDON BELL, the English pilot at the R.E.P. school, is now quite at home on his machine, and practically every day makes at least one flight of about an hour's duration. On the 25th ult. he was doing some fancy flying, and demonstrating the complete control which he had of his mount.

Quick Training at Pau.

AFTER only nine days instruction at the Blériot Military School at Pau, Lieut. de Bernis qualified for his pilot certificate, and twenty days after joining the school he made a flight of one hour at a height of 300 metres.

Long Flight by Military Officers.

AT Pau, on the 26th ult., Lieut. Massol made the out-and-home journey to Urt, a distance of 160 kiloms., in 1 hour 38 mins. His average height was 1,600 metres. On the following day he made a round trip of 150 kiloms. in the morning, touching at Peyrehorade and Urt, while in the afternoon he made a 240-kilom. trip from Pau to Biarritz. On Monday he also made a cross-country flight of an hour's duration.

An Hour on a Tellier.

AT St. Omer, on the 26th ult., Marc Pourpe was flying a Tellier monoplane fitted with a Chenu motor. He was up for over an hour, and flew over St. Omer and the neighbourhood at a great height.

Another Good Flight at Pau.

ON Saturday last, Etienne Giraud piloted one of the Blériot school machines from Pau to Eauze and back, a distance of 150 kiloms. In the afternoon he was taken for a flight by Leblanc on a two-seater Blériot, while on Monday, by way of finishing up his work at the school, he made a flight of about an hour's duration on this machine.

Sommer Monoplanes for French Army.

ON the 28th ult. at Douzy, before Capt. Destouches and Adjutant Ducasse, Bathiat tested four Sommer monoplanes, which were afterwards delivered to the French Army. With a load of 150 kilogs. they showed a speed of 107 k.p.h., and climbed 300 metres in 3 mins. 45 secs.

Honour for the Gnome Inventor.

AT last M. A. Seguin, the inventor of the Gnome motor, which has played such a large part in the development of aviation has been honoured by the French Government. In French aviation circles it has been a matter for wonder for some time that while aviators have been freely honoured, no notice has been taken of the man whose motor has done so much for the cause. Now, however, this has been remedied as the Cross of the Legion of Honour has been conferred on M. A. Seguin.



The Clement Bayard biplane, equipped with a Gnome engine, under test at Issy-les-Moulineaux. One of the principal characteristics of this machine is that it can be transformed, in the space of a few minutes, into a monoplane.

Vedrine as Lecturer.

ON Friday of last week Vedrine appeared in a new rôle, that of lecturer, at Toulouse. Naturally the subject was "Aviation," and in the course of his remarks he stated that he hoped one of these days to start from Pau in the morning and reach Calais in time for tea. He hoped with the new machine which he had on order to be able to get up to a speed of 110 miles an hour, and before very long to increase it to 125 miles an hour.

Flying to His Lectures.

IT is perhaps only to be expected that, when engaging on a lecture tour like this, Vedrine would hardly find the prosaic means of travelling by *chemin de fer* to his liking, and so, by way of practising what he preaches, he flew on his Deperdussin monoplane from Pau to Toulouse on the 25th ult., stopping on the way at Tarbes and St. Gaudens. On Saturday he left Toulouse to fly to Castelnau-d'Aud, where he gave a second lecture. On Monday he was to continue his journey to Marseilles, but only got the 36 kiloms. to Carcassonne, where he was delayed by the weather.

The Kaiser Offers a Prize.

ON the occasion of his birthday, H.I.M. the German Emperor offered a prize of 50,000 marks to be awarded to the maker of the best aeroplane motor made in Germany. The prize will be awarded on the next anniversary of the Emperor's birthday, Jan. 27th, 1913, on the recommendation of a commission consisting of representatives of the Imperial A.C., the Imperial Aero Club, the Association of German Aeroplane Makers, Charlottenburg University, and the Ministers of the Interior, Navy, Army, and Public Instruction.

A Reliability Trial for Germany.

UNDER the presidency of Prince Henry of Prussia a conference was held on the 29th ult. at the Kaiserlicher A.C. for the purpose of considering the possibility of organising a national endurance competition in the Upper Rhine district. It is probable that a number of military aviators will take part, and that three dirigibles, at least, will be present. Passenger-carrying will be an essential part of the competition.

Austrian Aeroplanes for China.

THE Chinese military authorities should soon have at their disposal quite a strong corps of aviators. In addition to those which have been trained in Great Britain, France, and the United States a couple of officers have spent some time at Wiener Neustadt learning to fly the Etrich monoplane. One left last week for China with two Etrich machines, while the other officer will shortly be returning home, also with a couple of similar planes.

Flying from Brussels Show.

ON the 29th ult. Crombez on his Deperdussin monoplane left

the Berchem flying ground, near Brussels, and flew to Geneck, about 116 kiloms., his time for the journey being an hour and a quarter. ■

In the afternoon of the same day, Lanser on the biplane which was on view at the Brussels Salon, and which was flown there by him, started to fly back to Kiewit-Hasselt, taking M. Sualart as passenger. He reached his destination safely after an hour and five minutes flying.

Aeroplane Stations in Morocco.

AT both Fez and Casablanca the French military authorities are to establish aviation centres, the organisation of that at Fez being undertaken first. Lieut. Clavenad will be in command of the two centres, and he leaves Marseilles for Morocco with the first detachment, consisting of three officers, fifteen mechanics, and four aeroplanes on February 16th.

President Taft on Aviation.

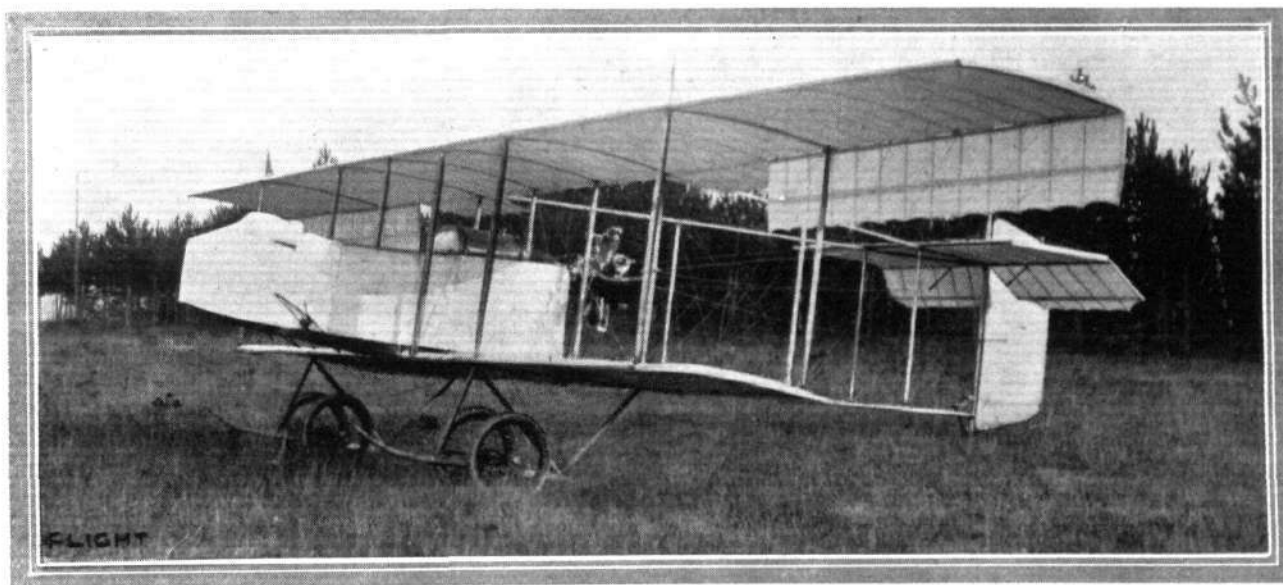
AT the annual dinner of the Aero Club of America, on January 28th, the guest of honour was President Taft, who in replying to the toast of his health said that his presence was an assurance of the attention which is being given to aviation by the American Government. Like other nations, the United States must this year make a great effort to place itself in the front rank. The president of the club, Mr. R. J. Collier, drew attention to the great amount of money being spent in France on military aviation as compared with what was being done in America. The French Ambassador also spoke, paying tribute to the splendid work which had been accomplished both by American and French pioneers.

The Curtiss Hydro-Aeroplane.

THE new hydro-aeroplane with which Glenn Curtiss is experimenting at San Diego, California, presents several radical differences to the earlier machines. In the first place the hydroplane is fitted close up to the lower main plane, and the motor, a 60-h.p. water-cooled Curtiss, is mounted in the hydroplane just in advance of the aeroplane's leading edge. The machine is fitted with twin tractor-screws, both driven in the same direction by chains. At the hands of Curtiss himself the machine at its first trial on January 10th, showed a speed of 60 m.p.h. in the air and 50 m.p.h. over the water. The engine is fitted with an automatic starter, designed by Curtiss, and it also has a clutch. The hydroplane is 20 ft. in length, and is substantially built, so that it can stand a good deal of knocking about on choppy seas. The pilot's seat is arranged in the hydroplane, towards the trailing edge of the main planes. There is no elevator in front.

Wireless Experiments by U.S. Army.

ONE of the Wright machines at the U.S. Army winter flying headquarters at Augusta, Ga., has been fitted with a wireless telegraphy apparatus designed in the Signal Office, Washington, and an extensive series of experiments are shortly to be made with it.



THE NEW HENRY FARMAN BIPLANE.—Extensive changes have been made in the construction of this new machine, the top and bottom pairs of tail outriggers being arranged in triangular form, and the tail surface itself being purely a monoplane type of organ with single vertical rudder. The position of the engine has also been changed, and by virtue of its present position midway between the planes the constructors have been enabled to reduce the height of the landing chassis, thus contributing to its robust construction.



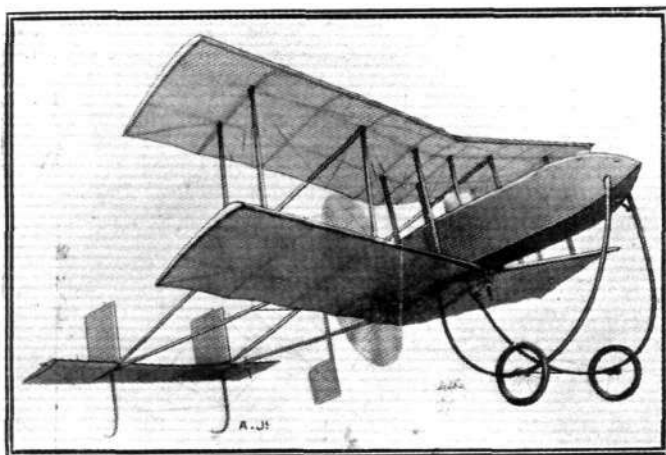
Conducted by V. E. JOHNSON, M.A.

CO₂ Motors.

CARBON dioxide gas in a liquid form is now a well-known commercial product, sold at about 1s. a pound, stored in steel cylinders. At a pressure of some 35 atmospheres this gas condenses to a liquid at 0°C., or it may be liquefied at ordinary atmospheric pressure by a temperature of -78°C. The liquefaction of the gas can be effected either by evolving it in a strong closed vessel, so that it is condensed by its own pressure, or by pumping the gas by means of an ordinary forcing-pump into a strong wrought-iron or steel receiver, kept during the process at a temperature of 0°. As soon as the volume of gas pumped in amounts to about thirty-seven times the volume of the receiver, each stroke of the pump produces a further condensation of the gas which is pumped in, and the vessel is easily filled with liquid CO₂ which is colourless and transparent. On being allowed to escape into the air, more especially if it emerges through a fine nozzle attached to the vessel, part of the liquid at once evaporates and assumes the gaseous state, so much heat being thereby lost that the remainder has no longer the necessary heat to maintain it in a liquid state. It therefore promptly freezes, thus producing a white snow-like mass (known popularly as carbonic acid snow) which evaporates comparatively slowly.

Liquefied CO₂ in expanding produces an enormous pressure which can be readily used in a motor provided that the freezing difficulty just referred to can be successfully overcome: it has this advantage over compressed air, that for the same quantity of gas, the pressure on the reservoir is much less, which removes the likelihood of an explosion—giving either a reduced weight or a greater factor of safety. One peculiarity of the liquefied form of the gas is that under the application of heat the liquid form expands more than the gaseous—being an exception to the rule that liquids expand by heat less than gases.

In the September 2nd, 1911, issue of FLIGHT, an illustrated description was given of the Cetonia CO₂ plant and motor, to which please refer. In this motor (by term motor we mean complete plant) the freezing difficulty is got over by using a cylinder filled with water at a temperature of about 90°C.; through this cylinder (or hot water bottle) runs a network of tubing into which the liquid CO₂ is passed direct, immersed as already stated in nearly boiling water. Now since CO₂ cannot remain liquid at a temperature above



The Cetonia biplane, which flew 1,178 metres in 92 secs. Length, 3 metres; breadth, 2½ metres.

31°C., its critical point, it immediately turns itself into a gas, and freezing is absolutely prevented by the specific heat of the water, which is very high.

It will thus be seen that the above plant is thoroughly well designed and very carefully thought out on the score of efficiency. The illustration shows the model referred to in September 2nd issue. The speed of the model was about 29 m.p.h. The weight of the complete plant is 4 kilogs., and of the complete machine 17½ kilogs. The officially-tested h.p., 1.03 h.p. at 1,710 r.p.m. for 1 min., and it is capable of driving a propeller 0.85 metres in diameter and 0.60 metres pitch (?) (the French is not clear) at 1,800 r.p.m.

In addition to winning the Gordon-Bennett Cup for models last

May, it has been awarded a gold medal (Concours Lépine, Paris), a special diploma, and has also been adopted by the military aeronautical establishment of Chalais Meudon.

And now, with respect to model aeroplanes of smaller size driven by the same means—are we to meet with the same difficulty that was experienced in the case of the petrol motor, or has the long hoped for solution of the problem, “an ideal motor for small aeroplanes” at length been reached?

The type of Cetonia motor referred to is what is known as the A type—the inclusive price in France, 225 francs. In a French catalogue just received, types B and C, ½ and ¾ h.p. respectively, are crossed out, presumably being constructed no longer. To enquiries made by us in France with respect to certain performances claimed by smaller CO₂ motors of another type, we have received no reply. The longest flight that we can learn of as made by such in England is 20 yds., hand launched. Monsieur Poterin du Motel, the inventor of the Cetonia motor, lays great stress on the necessity of using a hot water cylinder (a cub. ft. of water in losing 1° can raise 3,080 cub. ft. of air 1°) and indeed such is absolutely a necessity. Let us consider very briefly the critical point of liquefaction of CO₂, viz., 31°.35—above this temperature even if under so enormous a pressure as 72 atmospheres (72 × 14.7 lb. per sq. in.) it is impossible for the gas to liquefy—in other words above 31°.35 the gas cannot remain liquid no matter how great the pressure. Again, if the heat absorbed in its conversion from the gaseous to the liquid form is not supplied from some extraneous source—this very quickly has the effect of solidifying the remaining CO₂ liquid and immediately stopping the production of the gas.

All the same it does not seem impossible to achieve some measure of success by using (say) a 5-cylinder CO₂ engine of some 7 to 8 ozs. in weight, combined with a liquid-gas cylinder and a hot-water bottle, making up an inclusive weight of about 2 lbs., and we do not see why an efficient light-built model fitted with such a plant could not be got to fly.

The Propeller Problem.

Referring to the 22"-24"-26" propeller problem (January 20th issue), Mr. T. W. K. Clarke (who is well known as an authority on all questions relating to propellers) writes us as follows: “If y be the usefulness of a propeller, however measured, x the pitch, then $y=f(x)$. If then y is a maximum when $x=a$, we know that to the first order of small quantities, i.e., for all practical purposes, $f(a+h)=f(a-h)$ if h is small. Therefore, putting $a=24$ " and $h=2$ ", we see that the “usefulness” of each of the two propellers of 22" and 26" is the same. We take it that Mr. Clarke here assumes the 24" pitch to give the best result, i.e., to be the maximum value of the graph, and that it is symmetrical (for a short distance, at any rate) on either side. This is a point of view which had not occurred to us.

Notes.

Mr. C. C. Allport writes stating that the tips of the main plane of his Etrich model (see last week's issue) have a negative angle. The method in which the silk is sewn on causing such without the employment of any other device.

We have received a letter from Messrs. Willis Bros., of Hastings, in which they state that it was not a Mann monoplane which made the alleged 100 secs.' duration flight (see January 20th issue), but one of their own design and construction. We have also received a communication (and enclosures) from Mr. R. P. Grimmer, from which it appears (taking absolutely an impartial view of the matter) that Messrs. Mann and Grimmer fully believed it to be a Mann monoplane that was flown, and that the duration was 100 secs. As Mr. Grimmer candidly admits, whatever the machine flown, it is now apparent that the duration was not 100 secs. The best duration that the Mann can claim is 90 secs., and it does not therefore hold the club duration record, which is held at present by Mr. E. Trykle, of the Birmingham Model Aero Club, with a flight of 95 secs. (see FLIGHT, January 20th, 1912, p. 66).

Nothing, we should think, could more strongly emphasize than an incident of this kind the necessity for proper and absolutely reliable officially-tested records, and we are looking forward to some very interesting events on Wimbledon Common on February 17th. We note with much pleasure that February 17th is a Saturday.

Replies in Brief.

H.B.M.S.—Many thanks for your letter. Glad to hear you have been so successful.

M. L. ROLFE.—Re your experiments with tractor-screw models, we shall be glad to hear of any results you arrive at concerning fins.

V. L. ADDISON.—We do not agree with your deductions, but the matter is too long to deal with here; probably later on the identical matter will be dealt with. Consult Thurston's *Elementary Aeronautics*, pp. 64—65. The air is not driven off as you suppose; or only very slightly so.

J. RUET.—With a tip angle of 45° your pitch will be 18.8, *i.e.*, 19 ins.; with an angle of 40° it will be 15.8, *i.e.*, 16 ins. For ordinary purposes we should advise the last named.

A Model Club for Reading.

We have been asked to state that at a recent meeting of the

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THE KITE AND MODEL AEROPLANE ASSOCIATION.

(27, VICTORY ROAD, WIMBLEDON.)

The Paramount Body to Govern Models in this Country.

OFFICIAL NOTICES.

Annual General Meeting.—The annual general meeting will be held on Monday, February 5th, 1912, at the offices of The Aeronautical Society, 53, Victoria Street, S.W. (by kind permission of the Council), at 8 p.m.

Suggestions for competitions for the year will be received after the general business, all such suggestions should be written and handed to the hon. sec. prior to the start of the meeting. It is felt by the Council that this will give the members an opportunity to give their views and will be a help to the Competition Committee, and therefore of more benefit to the association than a lecture.

International Kite Ascents and free balloons with registering instruments attached. The days appointed by the International Commission for Scientific Aeronautics for 1912 are as follows:—February 1st, March 7th, April 11th, 12th and 13th, May 2nd and 6th (small series of ascents). July 1st to 6th (extended series of ascents). August 1st, September 5th, October 2nd, 3rd and 4th, November 7th, and December 6th (small series of ascents). During the week of international ascents special arrangements are made by the Meteorological Society for observations to be taken at Pyrtan Hill, Ditcham Park, and Glossop Moor. The observations are reported to Professor Hergesell, at Strasburg, President of the

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PROGRESS OF FLIGHT ABOUT THE COUNTRY.

NOTE.—Addresses, temporary or permanent, follow in each case the names of the clubs, where communications of our readers can be addressed direct to the Secretary. We would ask Club Secretaries in future to see that the notes regarding their Clubs reach the Editor of *FLIGHT*, 44, St. Martin's Lane, London, W.C., by first post Tuesday at latest.

MODEL CLUBS.

Bath and Somerset Aero Club (11, ELM PLACE, BATH).

THERE was a very good attendance at the Church Institute on Friday evening, the 26th ult., at which arrangements were made re glider. Dr. E. White presided, and among those present were Major L. M. Boileau, Messrs. H. W. Frampton, W. Palmer, J. L. Newstead, Lewis S. White, and S. A. Baker, hon. sec. Nearly a dozen members promised to assist in building the glider. Tuesdays and Thursdays, from 7 to 10, were fixed as glider building evenings, the commencing evening to be Tuesday, February 6th, and will all those who have promised to help (and those who would like to help and were not present at the meeting) please make a special note of this, and that the "construction shop" is over Messrs. Lewis Bros.' studios in Seymour Street.

The hon. secretary read a letter from Mr. D. Graham Gilmour, in which he says, "I shall be very pleased to become a vice-president, and in the future I hope I will be able to find time to fly over and give your club a lecture. I am building an aeroplane shed at Matlock, Somerset, this spring, which is to be used by anybody touring *en aeroplane*, so Somerset will be the first county, I think, to have a public aeroplane shed. Perhaps my own 'plane will be there sometimes."

There are probably some members who are unaware of the fact that a small band of our enthusiasts gather together at Mr. Gifford's field in Englishcombe Lane with their models most Saturday afternoons, and some good times are enjoyed. We extend a hearty welcome to any of our members or others interested, who are at liberty to join us.

Birmingham Aero Club (8, FREDERICK ROAD, EDGBASTON).

LAST week-end turned out to be a brilliant afternoon for model flying, although in the earlier part of the afternoon it was inclined to be gusty. Mr. E. Trykle obtained one long flight which was, unfortunately, not timed. The reappearance of Mr. G. Mason was welcomed, who was flying his old model. This model was beginning to go mouldy owing to non use. Fine exhibitions of gliding were

Reading Society of Model Engineers, it was decided to form an aeronautical section. The Society already possess a well equipped workshop (33, London Street), and several members who are practical aeromodelists, so its success should be assured. Mr. Fred Hart, 81, Whiteknights Road, Reading, will be pleased to supply all information to intending members or anyone interested in the project.

Y.M.C.A., George Street, Oxford.

Messrs. F. March and W. Ashfield, of the above, would be glad to hear from anyone interested in model flying in Oxford with the view to forming a club there. They will gladly send any information to anyone who would like to join.

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International Commission, for publication as arranged by International agreement, in accordance with the resolutions of the St. Petersburg Conference, September, 1904. All members making observations on these days should send in their reports to the hon. secretary as soon after the dates as possible, for him to forward to Professor Hergesell.

Applications for joining the new Kite Corps are coming in. All intending recruits must remember that they must belong to the Association, and therefore should send along their first annual subscription of 5s. with their applications, as it will save time to them and the secretary.

Membership.—The membership of the association is being added to each week. The Council, however, hope to double the number during the year commencing February, 1912, and trusts that all members will use their best influence in extending the membership. Subscription, 5s. per year. Juniors under 17, 2s. 6d.

Competitions.—Hydro-aeroplane competitions will be a feature this year (rising from and alighting on water). Also it is hoped to arrange one for motor-driven models if suitable place can be found.

W. H. AKEHURST, Hon. Sec.

given by Mr. E. Prosser with his Seagull model, the length of the glides being about 33 yards. The three junior members, Masters Stamps, Bibro and Purser, were all making good flights. Master Workman showed improvement with his model. Much interest was centred round Mr. Wilde's "Valkyrie"-type model, which on several occasions rose from the snow. When flying it gave a very pleasing spectacle indeed, its landings especially giving one the impression of a full-sized aeroplane.

The club will be pleased to receive visitors on its aerodrome on the Yardley Wood Road any week-end, when they may be sure of spending a pleasant afternoon and of receiving a hearty welcome. The monthly meeting in last week's *FLIGHT* was given as February 3rd; this, however, should be February 5th.

Blackheath Aero Club (12, MANOR ROAD, BROCKLEY, S.E.).

THERE was a splendid attendance at the Kidbrooke ground on Saturday last, in spite of a gusty wind which behaved in a very ungenerous manner towards a number of models. Mr. F. M. Bailey, with a monoplane fitted with "Antoinette" wings, and Mr. W. H. Egelstaff both tried for certificates, and Messrs. Pizey and Clark were flying their 24-oz. models. Good results were also obtained by Messrs. Woollard, Brown (of New Cross), Ford and Waghorn with "A" frame monoplanes. Messrs. L. Brough and A. B. Clark were out early on the Heath with several types of machines. The latest, a bamboo biplane built for Mr. Clark by Mr. H. H. Groves, made many beautiful ascents. It leaves the ground after a very short run, about 5 ft.; and on one occasion, when started from the frozen surface of a pond, it rose with only 100 revs. to each propeller out of possible 750, and continued to climb until the little power was exhausted.

At the Lee Aerodrome, Mr. H. H. Pizey's "24" again and again explored the neighbouring fields, whilst Messrs. Hoch and Trask were tuning up.

Later, at the C.P. Testing Ground, a huge crowd of interested spectators witnessed many flights by Mr. E. Hoch, and several new members joined.

Will members please note that the general meeting on Saturday, February 24th, will be held at the Central Hall, High Street, Peckham, and the Committee would like to see every present and prospective member in attendance at 6 p.m. sharp.

Flying as usual this week-end at each of the club's grounds, and a good number of experiments are expected in view of the "point-to-point" contest to be held at Kidbrooke on Saturday, March 9th. Full details will be supplied to anyone making written application to the above address.

Bootle and District Aero Club (39, BROOK ROAD, BOOTLE).

THE weather on Saturday last was fine but frosty, and in spite of the cold a good number of members were present. Some good flying was seen, notably by Messrs. Ledward, S. Malins, Pugh, Harley, Danson, and Stephens. Mr. Ledward rose the club's duration record to 30 secs.; this, however, was not a record for long, because he shortly beat this by a really good flight of 33 secs., which is a record to date. Mr. Harley obtained a flight of 22 secs. duration, and later Mr. S. Malins with the same machine rose the duration to 25 secs. The distances, too, were distinctly better; although not officially measured they were evidently somewhere about 500 ft.

There will be a meeting to-day (Saturday) at 3 p.m.

Brighton and District Model Ae.C. (36, LITTLE PRESTON ST.)

SATURDAY last, although piercingly cold, saw some good flying at Brighton-Shoreham Aerodrome. Mr. Bate was flying 6-oz. geared (level) monoplane, which climbs well. With this model, when thoroughly tuned, quarter of a mile should not be impossible. After about a dozen good flights she landed badly, being struck by a heavy gust and disintegrated. Mr. Bate had three other models up, including a "tractor," which did about 50 yards. Mr. Burghope struggled to the aerodrome with four models bound to his big 'bus. It is said he was blown off the ground each time a gust struck his 21-oz.'s wings, but he indignantly denies this. He got some high flights with a 2-oz. model. One of Mr. Burghope's models—a 16-in. span biplane (1½ ozs.)—was very stable with dead flat (laterally) wings and low centre of thrust. This little model stood still against the wind with motor stopped and gently pancaked. Mr. Frost was out with a small surfaced racer which fairly "wiped." It must be loaded about 17 oz. to a square foot. When members were all thoroughly cold they thought they would "hang on" to the Gnome-Blackburn. The four who succeeded in holding the machine back for nearly five minutes will never do it again. Hanging on to the chassis struts five feet behind propeller did not warm them, in spite of physical exertion. Flying next Saturday as usual. Members are advised to overpower their models for cold weather. All communications to hon. sec., A. Von Wichmann, "Kingsleigh," Kingsway, Hove.

Bristol Model Flying (3, ROYAL YORK CRESCENT, CLIFTON).

MEETING at Sea Walls on 27th ult. Longest flights—Messrs. Moore (single propeller), Pearse, Brewerton, and Smith. Audience took embarrassing interest in large machines' *vol planés*. Meetings every Saturday.

Cardiff Aero Club (114, MISKIN STREET).

MR. CHARLES COLES, B.Sc., Cardiff Technical School Adviser, has become the vice-president of the club, much to the gratification of the members.

It is proposed to take part in an exhibition flight on February 17th, at Cardiff. Models should be at headquarters before the 16th inst.

Croydon and District Aero Club (129, HIGH STREET).

ON Wednesday last good flights were obtained by Messrs. C. Smither and Weston. Messrs. Cooper and Pavely were experimenting with tractor-screw models. Mr. Pavely's twin-tractor monoplane, which was the chief attraction, rose from the ground and flew a distance of 250 ft. The flying during week-end was very good, and despite the very cold weather and the wind there were good turn-outs on each occasion.

On Friday, Mr. H. Smither's machine made a good flight of a ¼ of a mile, but its next ended in the "Mitcham Lakes," which washed the lubricant off the elastic, and as this necessity was very scarce the model had to be put by. Mr. C. Smither's "Rocket" and single stick models made numerous long flights of from 300 to 400 yds., the "Rocket" flying as high as 80 ft., hence its name.

On Saturday, Mr. Pare brought out a Bragg-Smith biplane which seemed to ignore the wind and persisted in making good flights. Mr. Hart, who made good flights of 500 yds. on the previous Saturday, unfortunately had his model broken by a spectator before he commenced to fly.

A pair of carved propellers will be given to-day (Saturday) to the member who obtains most points in distance and duration competition. A silver cup is also being given in a week or two, so hesitating members should join before it is too late. Write to the secretary for particulars of club.

Dover and District Model Ae.C. ("OAKVILLE," GODWYNE ROAD)

THE club held good meetings on Wednesday and Saturday afternoons last week, although the wind was strong and gusty on both occasions. H. Whorwell made some capital flights at both meetings, and other good results were obtained by most of the members. On Wednesday, Whorwell won a pair of 8-in. propellers offered by H. Holman for the best duration flight of the afternoon. It was decided that the club should issue special certificates to those of its members who are most proficient.

Ealing and District Model Ae.C. (1, QUEEN'S GDNS., EALING, W.)

THE committee was elected at the meeting on the 27th ult. It was decided to amend the regulation with regard to exclusion of professionals. It was also decided that, in competitions, members must use machines of their own construction, including propellers. Subscription was fixed as follows: Seniors (over 16), 5s. per annum; juniors (under 16), 2s. 6d. per annum, both payable quarterly to Mr. S. Hall, who will be pleased to receive same at next Saturday's meeting. First quarter's subscription is now due, and as funds are urgently needed members are asked to remember the above.

In spite of the inclement weather conditions at flying meeting last Saturday, ten members turned up with models, and good flights were obtained. L. Roche's 3-oz. model flew magnificently the whole afternoon, sometimes getting up to 120 ft. His longest flight was one of 865 ft. (measured in straight line), at height of 80 ft., ending in a long *vol plané*. L. Kirchner's model flew rather well, considering the wind. Afternoon's flying ended in the popular illuminated flying by Messrs. Line and L. Roche. On Sunday, L. and C. Roche were flying and managed to get decent circular flights at good height, in spite of frozen atmosphere. It is hoped to arrange a general meeting soon at which the future work of the club will be discussed. Flying meeting to-day (Saturday) at 2.30 p.m. at usual place.

Hackney and District Ae.C. (47, JENNER RD., STOKE NEWINGTON).

DEMONSTRATION on Hackney Downs last Saturday highly successful. Mr. Harlin, of the Paddington club, favoured us with a demonstration of W.H.C. models. It being our first meeting most members were tuning up. Members please note that these meetings take place every Saturday on Hackney Downs at 3.30 p.m., until Hackney Marshes emerge once more from the water. All interested in this club should send postcard for particulars to hon. sec.

Higher Broughton Model Soc. (1, ESKRIDGE ST., MANCHESTER).

ON Saturday last the weather was ideal for flying, and Messrs. E. Whittaker and Ed. Hurlston spent the afternoon testing the latter's Mann monoplane. At first launch the model rose considerably, and flew about 75 ft., and after careful adjusting repeated flights were made, the longest of which was well over 300 ft. Sunday was extremely cold, and the same members secured at least half-a-dozen good and straight flights of 400 ft., thus bettering the previous day's performance. A lecture, the title of which will be announced next week, will be delivered (members only) on February 10th.

Manchester Aero Club (8, EXCHANGE STREET, MANCHESTER).

AT a committee meeting of the club, held on the 23rd ult., the resignation of Mr. F. Akenhead as clerk to committee was accepted with regret, and W. Naylor Spence was appointed to the position. All communications relative to aviation in Manchester should in future be sent to Mr. Spence at the above address.

It having been proposed that an aviation dinner be held in the Midland Hotel, Manchester, during the month of February, the arrangements for same were left in the hands of a sub-committee. All gentlemen interested in aviation and willing to attend the dinner, are invited to communicate with Mr. Spence. It is probable that many topics of interest, likely to further extend the art of flying in Manchester district, will be served up with the "coffee and cigars."

Manchester Model Ae.C. (40, BIGNOR STREET, CHEETHAM).

A FLYING meeting will be held at the Trafford Park Aerodrome (near the golf links), to-day, February 3rd, at 3 p.m. It is hoped that many models will be brought.

Paddington & Districts Ae.C. (133, BUCHANAN GDNS., HARLES DEN)

MEMBERS very busy in club workshop in view of competitions for models made therein. Messrs. Carter and Woolley finished Fleming-Williams type monoplanes which were given trial flights at the club's private flying ground, at Parkside, Sudbury. These models have their main planes below the single stick and vertical fin in lieu of the elevator. Flights were very stable. Distance flown, about 100 yds., require more power. Model constructed by W. Jackson, flew 120 ft., but landing badly smashed one propeller. W. Evans' "old crock" made a good steady flight of 300 yds. The secretary showed members a pair of four-bladed propellers of his own construction, which attracted much attention, the workmanship being considered excellent.

A new biplane glider, constructed by the owner, Mr. H. L. Hill, arrived on Saturday at the flying ground. Span 24 ft., chord 5 ft., very lightly constructed. Capital sport is promised.

The next general monthly meeting of members will take place at the club workshop, Windsor Place, Harrow Road, Paddington, on Wednesday, February 7th, when the secretary, W. Evans, will give a lecture, at 8 p.m., on "Selecting wood for model aeroplanes." Visitors will be welcomed.

Palmer's Green and District Model Ae.C. (15, MOFFAT RD., N.).

A SUCCESSFUL competition for distance was held last Saturday. The weather was cold, but dry. The first place was taken by R. L. Rogers, with a machine of his own design, which made a high flight of 1,195 ft. With a slight following breeze the model reached a height of 100 ft. 600 turns were given to the rubber. Second place was captured by E. R. Brown, with a flight of 801 ft. His "Mann" monoplane was flying very straight and was very consistent. An increased number of turns would have improved its distances considerably. H. Longland also made some good flights and obtained third place with 751 ft. His distances were, however, marred by circling and faulty rubber. Good work was also put in by Messrs. Lingard, Trollope, P. Brown and Reed. Many had trouble with steering. H. Lingard's machine did not fly up to form, and his luck was quite out. A. Trollope also had misfortune in smashing a well-made $3\frac{1}{2}$ ft. "tail-behinder" against a tree.

To-day, February 3rd, the novices competition will be held at 3 o'clock. Members are also reminded that an open duration competition will be held on February 10th.

The club wish to thank Mr. R. G. Corder for his kind visit and hope to see him on the ground again soon.

St. Mary's Model Ae.C. (THE VICARAGE, KINGSTON, PORTSMOUTH)

EXCELLENT attendance on Saturday last. Weather fine and bright, but very cold. All members except two had machines out, and those were new members. First event a friendly point-to-point contest on a triangular course of 200 yds. side. Mr. E. Eburne was only one to complete, which he did in 28 flights. All others had a good try, and Mr. E. Restall made good progress for two-thirds of the distance, and then his machine made a flight of 350 yds. back towards No. 1 control, so he gave up. Mr. E. Eburne made a new record for distance and duration in the club by a flight of 2,050 ft. straight flight and 60 secs. duration with a machine 3 ft. long, 20 in. span, 5 in. chord, 9 in. \times 12 in. steamed propellers, and $1\frac{1}{4}$ ozs. of rubber. Type 0-1-1-2P, floating tail. Mr. E. Restall's model rose from ground and did some good flights, and afterwards with chassis removed did several between 300 and 400 yds. and one of just over a quarter of a mile in straight line. Type 1-1-0-2P.

Several new members have joined, and all are making good progress. More members still wanted. Particulars from hon. sec., 52, Beecham Road, Kingston, or Rev. P. T. Clayton, The Vicarage, Kingston. Next meeting February 14th, at 8.30 p.m.

Salisbury Model Aero Club (39, CATHERINE STREET).

A LARGE number of members turned out at the new flying ground last Saturday, when some excellent work was witnessed by a

fair number of spectators. Two members gained their second-class certificates on that day.

Keen competition is promised in the February aggregate distance contest, and all members are desired to do their best to make this feature a success.

A meeting will be held to-day (Saturday) at the flying ground at 3 o'clock. All invited.

Next general meeting on February 6th.

Scottish Ae.S. Model Aero Club (6, McLELLAN STREET, GOVAN).

THE committee regret to announce the death of the vice-president, Mr. George Riddoch, who was fatally assaulted in Ashton Lane, near to the club's old workshop. It is generally believed that Mr. Riddoch was engaged in business of the club when he met his untimely end. Always a hard worker who had the good of the club at heart, and a keen student of the science of aviation, he will always be remembered as one of the pioneers of the club.

The official figures for the flying meeting held at Barrhead on the 20th inst. are as follows:—Mr. J. Mills, distance 1,145 ft., duration 33 secs.; Mr. J. C. Balden, 1,068 ft., 46 secs.; Mr. C. Arthur, 610 ft., 25 secs.; Mr. E. Langlands, 44 $\frac{1}{2}$ secs.; Mr. J. S. Gordon, 41 $\frac{1}{2}$ secs. It should be noted that distance and duration are separate flights. Next competition, February 17th, at Barrhead. On Friday evening, 26th ult., Mr. F. Norman, of the Scottish Aviation Co., delivered a brilliant address in the Institute. The lecture was illustrated by diagrams and photos in limelight, and was much enjoyed.

The next lecture will be given in the Institute, Elmbank Crescent, Glasgow, by Mr. D. N. Robertson, whose subject will be "Internal-Combustion Engines." In view of the recent sad event, it has been considered advisable to postpone the smoking concert to be held on February 8th indefinitely. There will be practice flying at Ibrox to-day, Saturday; also next Saturday.

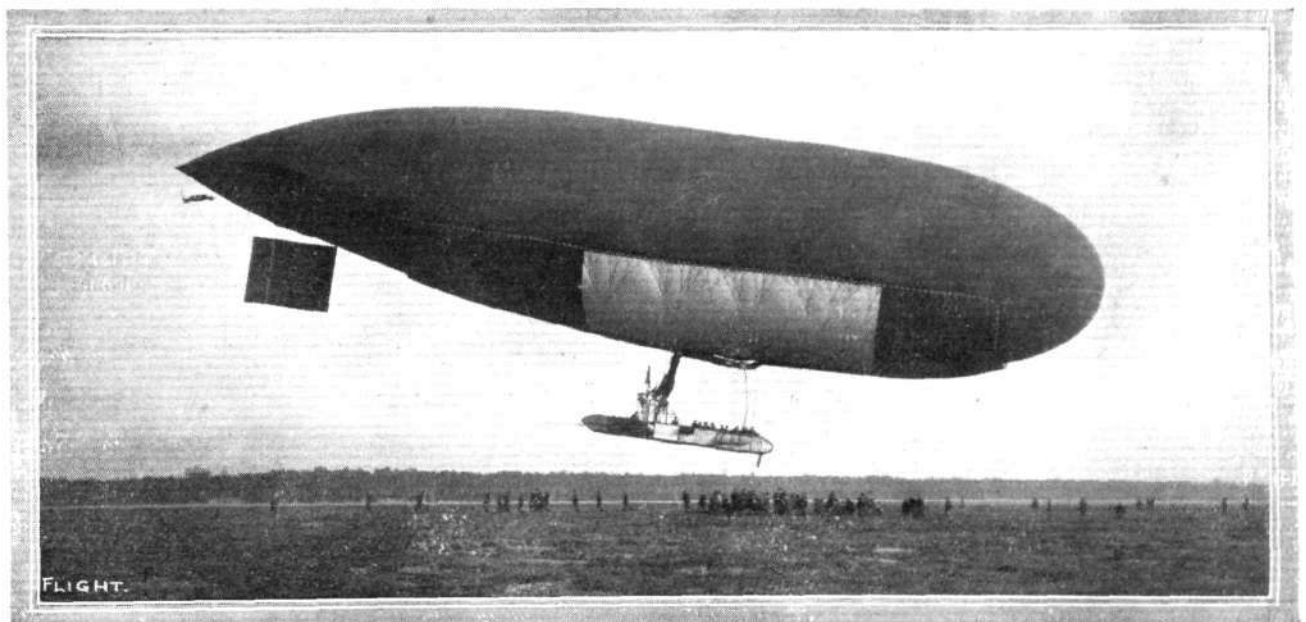
Worcester Model Aero Club (VICTORIA INSTITUTE, WORCESTER).

THE club met on Saturday last, and had good flying on their ground. The next meeting will be on the club ground, Pitchcroft, to-day, February 3rd, at 3 p.m. The programme will consist of competitions for distance, duration, efficiency, and directional control. These competitions are open to members only. New members will be welcomed by Stanley A. Sears, hon. sec.

Yorkshire Ae.C. (Model Section) (5A, HULLAND ST., LEEDS).

A MEETING was held on Saturday last at Carlton Hill Aerodrome, when a distance competition was arranged to take place to-day, Saturday, February 3rd, in Beckett's Park, Headingley, at 3 prompt. Competition open to all, members and non-members: 1st prize, 5s.; 2nd, 3s.; 3rd, a pair of 8-in. carved propellers, value 2s. Each competitor will be allowed three flights, the best of the three to count. Entrance fee, 2d. per model. Discussion, re a club glider, was again brought up, but after a lengthy argument it was decided that for the present this idea could not be carried out.

It was also decided that Mr. John Holmes, aged 74, of Joseph Street, Leeds, be made a free member, in recognition of the keen enthusiasm displayed.



"Parseval VI" descending at Johannisthal after a trip to Berlin on January 10th with Lady Shelley and her party as passengers.

CORRESPONDENCE.

Correspondents communicating with regard to letters which have appeared in FLIGHT, would much facilitate ready reference by quoting the number of each letter.

Bomb Dropping.

[1481] We seem to be moving in the right direction at last. The article signed S.H.S.M., which bears strong internal evidence of having been written by a naval officer who knows his subject, is admirable.

Attack with bombs in the near future may be confidently expected to take two general forms.

(i) The attack of dockyards, ships, and important railway junctions with large bombs of such a size that an aeroplane could only carry one, or, at most, two of them. The attack being made by a group of aeroplanes acting together. I happen to know that a foreign power has lately been making inquiries about a releasing gear, similar to that used in lowering boats, for use with bombs of this sort, the bomb being slung below the machine.

(ii) The attack of troops and dirigibles with small bombs of the nature of hand grenades. These might well be dropped from a tube by the action of a pedal, a shower of ten or so being discharged in four or five seconds. A crude beginning of this form of attack has been seen in Tripoli.

For case (i) an elaborate sight, such as that sketched out in the article referred to, would be required. For case (ii), I suggest that a simpler form, with which allowances for leeway of machine, wind, and movement of target (if any) would be made on the deflection scale, would be sufficiently accurate.

As regards the bomb illustrated, I take it for granted that your correspondent has considered the possibility of obtaining steadiness in flight by fitting a light tail, and has deliberately adopted the screw as giving the greater efficiency.

As regards the suggested sight, which, of course, in its final form would be much more compact and handy than it appears in diagram, it is admittedly not quite accurate if the machine is tilted longitudinally; neither, I fancy, is it accurate when the machine is listed. I suggest (with great diffidence) that it might be better to hang the whole system in gimbals. R.A. (Retired).

We are promised bomb-dropping experiments on a large scale in France this summer.

Points for Discussion.

[1482] Here are a few points, not generally known, that may interest some of your readers:—

If the wings of an aeroplane have a pronounced inverted dihedral angle, the machine will steer contrarily to the control of the rudder, viz., The side slip, consequent on the turning motion imparted by the rudder, will depress the outer wing, the inner wing thus finding itself raised, will overcome the action of the rudder, and swing round toward the periphery of the circle described by the machine, and reverse the turning movement.

The reason that a lifting tail machine has to dive in turning is due to the fact that the tail, travelling diagonally through the air, loses a large percentage of its efficiency, and drops. Thus a lifting tail should always be of the cruciform type as on the Breguet biplane, when the tail plane follows the direction of the rudder, and always travels forwards.

That in a machine of the tail-first or Valkyrie type, if the elevator is exactly balanced about its centre of pressure, and is flat, and at least one quarter of the area of the main planes, it may be mounted loosely upon its bearings, and needs no control, as it adjusts itself automatically.

That in a biplane of the latest Wright type, if the propellers revolve inwards, viewed from the back, they exert a downward pressure on the tail, and if the engine should stop the machine will tend to dive conversely, if the propellers revolve outwards, viewed from the back they exert an upward pressure on the tail, and if the engine stops the tail will drop.

That in a biplane or other multiplane where the planes are super-imposed, these should be staggered forwards from top to bottom, and not backwards as in the Farman and Goupy biplanes, this latter system having been adopted to present a larger parachuting surface when landing, which would be unnecessary with a proper landing chassis. That if the plane of an aeroplane is cambered from tip to centre in very much the same way as from front to rear, as in the Sanders biplane, the machine will scarcely be affected by side gusts, and end losses will be prevented.

That in birds whose wings are swept back, as in the Etrich and Weiss monoplanes, the backward-swept flexible tips serve two purposes; that of propeller in flapping flight, and that of tail in gliding, as the flapping motion of the wing causes the flexible tips to deflect a current of air backwards in very much the same way as a fish's tail deflects the water.

Richmond.

JOHN CLIVE.

Flying at Rhyl.

ON Thursday of last week Mr. Vivian Hewitt made a very fine flight around Rhyl, lasting one hour and ten minutes. He started from his hangar at Foryd, and after flying over the sea and dropping signed photographs on to the Promenade he flew over to Prestatyn, about five miles away, and circled the town twice. Just as he was on the point of returning he caught sight of the 4.15 express from Rhyl to Chester, and determined to have a race with it. He planed down from a height of 2,000 ft. till he was only about 100 ft. from the ground, and getting level with the train gradually started overhauling it. The passengers were soon all hanging out of the windows, whilst the driver and fireman entered into the spirit of the race, and urged their engine on, but it was to no purpose, and after a run of about 10 miles Mr. Hewitt was about 100 yards in front. He then turned round, and flew back to Rhyl, encountering on the way an inquisitive sea-gull, which seemed to imagine the Blériot was an enormous bird. The aviator steered his machine to the right and left once or twice, to try and avoid the gull, but it persisted in flying round the machine several times before finally diving under the left wing. Before coming down in front of his hangar at Foryd, Mr. Hewitt flew round Rhuddlan Castle.

The Index to Vol. III of FLIGHT (1911) is now ready. Price 3d. (post free 4d.) of the Publishers, 44, St. Martin's Lane, W.C.

PUBLICATIONS RECEIVED.

Model Flying Machines: their Design and Construction. By W. G. Aston. London: Iliffe and Sons, Ltd., 20, Tudor Street. Price 1s. net.

Catalogue.

Wire Stay Rods, Ropes, and Strands for Aeroplanes and Dirigible Balloons. W. N. Brunton and Son, Steel Wire and Rope Works, Musselburgh, Scotland.

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Aeronautical Patents Published.

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- 3,334. M. F. SUETER, F. L. M. BOOTHBY AND H. G. PATERSON. Combined magneto ignition-gear and wireless telegraphy apparatus.
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